DOCUMENT RESUME

ED 217 134 CE 031 640

AUTHOR Thornton, L. Jay; And Others
TITLE Clustered Construction Trades Reading Strategies. 1981 Vocational Reading Series.
INSTITUTION Pennsylvania State Univ., University Park. Div. of Occupational and Vocational Studies.
SPONS AGENCY Pennsylvania State Dept. of Education, Harrisburg. Bureau of Vocational and Technical Education.
PUB DATE 81
NOTE 190p.; For related documents see CE 031 638-641, ED 192 017-018, ED 192 023-025, and ED 194 873.

EDRS PRICE MF01/PC08 Plus Postage.
DESCRIPTORS *Building Trades; Case (Grammar); Cloze Procedure; Content Area Reading; *Corrective Reading; Directed Reading Activity; Informal Assessment; Integrated Activities; Job Skills; Learning Activities; Learning Problems; Postsecondary Education; Readability; Readability Formulas; Reading Comprehension; Reading Difficulties; *Reading Skills; Secondary Education; *Study Skills; Teaching Guides; *Trade and Industrial Education; *Vocabulary Skills; Vocational Education

ABSTRACT

Clustered Construction Trades Reading Strategies is one of four instructional guides developed to assist teachers working with students considered disadvantaged because of reading deficiency. Section 1 concerns readability and gives procedures and guidelines for collecting samples. Section 2 briefly describes the Cloze procedure and its usefulness as a reading test and teaching technique. Informal assessment is the focus of section 3. Three informal assessments with sample answer sheets and suggested-approximate answers are provided. Section 4 is an introduction to the guide (sections 5-10) which offers ideas and procedures for integrating reading skills with the occupational content (vocational textbook). Sections 5-8 each present a set of content reading skills: vocabulary skills, comprehension skills (paragraph), comprehension skills (recognizing and recording complex information), and study/reading skills. Each skill is divided into segments requiring 5-20 minutes of class time for introduction and practice. Homework uses text assignments normally required. Each section introduces a skill, uses a variety of vocational examples to clarify it, provides exercises to apply and master the skill, and offers teaching suggestions. Section 8 also includes a section on suggested reinforcement activities. Section 9 offers guidelines for making a reading assignment. Section 10 makes further suggestions for reading skills development. (YLB)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED217134

CLUSTERED CONSTRUCTION TRADES READING STRATEGIES

1981 Vocational Reading Series

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

✓ This document has been reproduced as received from the person or organization originating it.
Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

B. Ford

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Division of Occupational and Vocational Studies
The Pennsylvania State University

CE031640

CLUSTERED CONSTRUCTION TRADES READING STRATEGIES

L. Jay Thornton
Project Director

Betty Holmboe
Reading Consultant

Ta-Wei Lee
Leslie Schuller
Project Associates

VOCATIONAL READING SERIES

Division of Occupational and Vocational Studies
The Pennsylvania State University

Pennsylvania Department of Education
Bureau of Vocational Education

1981

FORWARD

Education amendments in 1976 (P.L. 94-482) provided for special assistance to a wide variety of students with "special needs." The special needs of these students are derived from conditions of the students which are believed to inhibit success in vocational programs. Both handicapped and disadvantaged individuals are to be served by the legislative provisions.

Academically disadvantaged students are those individuals who, because of math, reading, or communication deficiencies, may not be able to succeed in vocational programs. Legislation has provided for research and development projects to address the needs of these individuals. The projects in progress have been designed to respond to that call for research and development.

This instructional guide was developed for the purpose of assisting Construction Trades Teachers in their work with students who are considered disadvantaged because of reading deficiency. It was developed as a result of vocational reading research at The Pennsylvania State University. The guide was intended to be field tested in selected classrooms in 1981, funded by the Pennsylvania Department of Education.

"Clustered Construction Trades Reading Strategies" have been developed according to certain distinct characteristics of reading requirements in vocational education:

(1) Reading is a vocational skill, one that requires reading abilities that differ from those associated with general literacy.

(2) There is a difference between curricular literature (textbooks and other literature which must be read in the context of student status) and occupational literature (manufacturers instructions, codes, specifications, safety warnings, etc.).

(3) Occupational reading skills are appropriately addressed in the vocational curriculum.

(4) There are strategies available to vocational teachers which need little or no reading specialization.

(5) Available strategies reflect the unique qualities of vocational reading, address general vocational reading skill requirements, and are useful for helping students disadvantaged because of reading deficiencies.

This guide is NOT intended to be envisioned as the final word in reading strategies. It contains examples of several strategies believed to be useful for the vocational instructor seeking methods that are specifically related to construction trades instruction. The instructors are responsible for taking these examples and applying them to their occupational specialties. Not all of the methods will work for all construction trades teachers

or their respective students. The methods were designed to be adapted, not rigidly adhered to.

Companion R & D projects at Penn State provide useful complementary aids. An Employability Skills Curriculum Guide (Wircenski, McPherson, Feng, 1980) is available. That guide addresses socialization, financial management, values clarification, job procurement, and communication skills. Three other occupational clusters (Health Occupation, Business, and Trade & Industrial) will be the basis for reading strategy guides. These guides will focus more specifically on the respective individual occupational areas utilizing a format similar to the construction trades guide.

Field testing during the 1981-82 school year is expected to result in additional refinements of the several reading strategies. Criticism and recommendations are invited by all who receive these materials. Correspondence should be addressed to:

Director
Reading Intervention Strategies Project
119 Rackley Building
The Pennsylvania State University
University Park, PA 16802

L. Jay Thornton, Ph.D.
Project Director
1981

ACKNOWLEDGEMENTS

The Vocational Reading Series, of which this book is one part, has resulted from research conducted by the Division of Occupational and Vocational Studies, The Pennsylvania State University and the Bureau of Vocational Education, Pennsylvania Department of Education. Many people, not expressly identified as part of the project, have served willingly in the dispatch of its objectives. Appreciation is especially expressed to Mr. Wayne Grubb, Consultant for Disadvantaged and Handicapped, Bureau of Vocational Education, Pennsylvania Department of Education, for his support and procedural advice.

Several Area Vocational-Technical Schools in the Center Region of Pennsylvania participated in the development of the series. Scores of manufacturers, publishers, and employers provided literature and information. A listing of the schools, manufacturers, publishers, and employers follows. The project would have been impossible without their help.

Two research efforts provided considerable information toward the development of the series. The first, Basic Reading Skills and Vocational Education, was published by the National Center for Research in Vocational Education under the auspices of the Knowledge Transformation Project. That publication was supervised by Dr. Carol P. Kowle. The second, Review and Synthesis

of Reading In Post-Secondary Occupational Education, was published by the Division of Occupational and Vocational Studies in conjunction with the Division of Education Administration Policy Studies and The Pennsylvania Department of Education. Both titles are available directly from their respective publishers.

Appreciation is expressed to Mrs. Linda Cartright for her careful attention to the typing and proofreading of not only the final drafts of each title in the series, but all the preliminary work and intervening drafts required. The assistance of Edie Johnson, Division Secretary, and Jan Drew, Division Budget Secretary, is especially appreciated.

DISCLAIMER

The activity which is the subject upon which this guide was based was supported in whole or in part by the U.S. Department of Education. However, the opinions expressed herein do not necessarily reflect the position or policy of the U.S. Department of Education, and no official endorsement by the U.S. Department of Education should be inferred.

LIST OF PARTICIPATING SCHOOLS

Altoona AVTS

Bradford County AVTS

Centre County AVTS

Clearfield County AVTS

Columbia-Montour AVTS

Dauphin County AVTS

Franklin County AVTS

Harrisburg-Steelton-Highspire AVTS

Huntingdon County AVTS

Juniata-Mifflin County AVTS

Lancaster AVTS - Mt. Joy

Lebanon County AVTS

Seneca Highlands AVTS

SUN AVTS

Northumberland County AVTS

Williamsport AVTS

York County AVTS

Carlisle Area School District

Danville Senior High School (Nursing)

Hanover Public School District (Nursing)

Milton Area Senior High School

Tyrone Area High School

LIST OF PARTICIPATING PUBLISHERS

American Technical Society
5608 Stony Island Ave.
Chicago, Illinois

Bennett, Charles A.,
Publishing Company
809 W. Detweiller Drive
Peoria, Illinois

Bobbs-Merrill Co., Inc.
Box 558, 4300 W. 62nd St.
Indianapolis, Indiana

Brown, William C., Co.
2460 Kerper Blvd.
Dubuque, Iowa

Cahners Books
AVI Publishing Co.
Box 831
Westport, Connecticut

Delmar Publishing Co.
Division of Litten Edu.
Publishing, Inc.
50 Wolf Road
Albany, New York

Ginn Company
191 Spring St.
Lexington, Massachusettes

Goodheart - Willcox Co.
123 W. Taft Drive
South Holland, Illinois

Harper & Row Publishers
10 E. 53rd St.
New York, New York

Hayden Book Co., Inc.
50 Essex Street
Rockelle Park, New Jersey

Holt, Rinehart & Winston
of Canada Ltd.
55 Horner Avenue
Toronto, Ontario
Canada

Krieger Publishing Co., Inc.
P. O. Box 542
Huntington, New York

McCutchen Publishing Corp.
2526 Grove Street
Berkeley, California

McGraw-Hill Book Co.
Princeton Road
Highstown, New York

McKnight & McKnight Publishers
P. O. Box 2854
Bloomington, Illinois

Mosby, C. V., Co.
11830 Westling Industrial Dr.
St. Louis, Missouri

Prentice Hall, Inc.
Englewood Cliffs, New Jersey

Saunders, W. B., Co.
W. Washington Square
Philadelphia, Pennsylvania

South-Western Publishing Co.
5101 Madison Rd.
Cincinnati, Ohio

Wiley, John and Sons, Inc.
605 Third Ave.
New York, New York

LIST OF PARTICIPATING MANUFACTURERS AND EMPLOYERS

ATSCO
2932 West Liberty Ave.
Pittsburgh, PA 15216

Abbey Etna Machine Co.
3400 E. Indiana Avenue
Perrysburg, OH 43551

J. Aderer Inc.
20-25 44th Avenue
Long Island City, NY 11101

Air Techniques, Inc.
70-T, Cantiague Rock Rd.
Hicksville, NY 11801

Airco Welding Products
Division of Airco, Inc.
575-A Mountain Avenue
Murray Hill, NJ 07974

Alloy Rods Division Chemetron
Corp. Member
Metals Group Allegheny
Ludlum Industries Inc.
Wilson Avenue, Dept. TR
Hanover, PA 17331

American Cleaning Equipment
Corp.
111 S. Rte. 53
Addison, IL 60101

Arco Electric Products Corp.
P.O. Box 278
Dept. TR
Shelbyville, IN 46176

Auto-Trol Technology Corp.
5650 N. Pecos Street
Denver, CO 80221

Bumpa-Tel, Inc.
P.O. Box 338
Cape Girardeau, MO 63701

Calumet Coach Co.
11577 S. Wabash Avenue
Chicago, IL 60628

Challenge-Cook Brothers, Inc.
15421 E. Gale Avenue
Dept. TR
Industry, CA 91745

Charmilles Corp. of America
58-T Enter Lane
Hauppauge, NY 11787

Columbus Show Case Co.
850 W. 5th Avenue
Columbus, OH 43212

Co-Ordinated Industries Inc.
Flaugherty Run Road
Coraopolis, PA 15108

Crown Engineering Corp.
18 Timber Lane
Marlboro, NJ 07746

Davey Compressor Company
11062 Kenwood Rd.
Cincinnati, OH 45242

Delta Steel Buildings Co.
P.O. Box 20977 - TR
Dallas, TX 75220

Denticator Co., Inc.
1068 Mission Street
San Francisco, CA 94103

Dexter Axle Division
Philips Industries, Inc.
2032 S. Main Street
Elkhart, IN 56514

Diffraction Company
Dept. TR
Riderwood, MD 21139

LIST OF PARTICIPATING MANUFACTURERS AND EMPLOYERS
(Continued)

Discojet Corp.
922 Third Street
Davis, CA 95616

Dollar Electric Co.
1030 W. Thirteen Mile Rd.
P.O. Box 587
Madison Heights, MI 48071

Donaldson Company, Inc.
P.O. Box 1299
Minneapolis, MN 55440

Doyle Vacuum Cleaner Co.
223 Stevens Street S.W.
Grand Rapids, MI 49507

E-B Advertising Display Co., Inc.
2035 Wales Rd., N.E.
Massillon, OH 44646

Eagle Machinery Co.
A division of Package
Machinery Co.
948-52 88th Avenue
Oakland, CA 94621

Easi File Corporation
2945-T Randolph Avenue
Cost Mesa, CA 92626

Eitzen, Louis C. Co., Inc.
P.O. Box 1210-T
Glenwood Springs, CO 81601

FMC Corporation
Coffin Turbo Pump
326 S. Dean Street
Englewood, NJ 07631

Filpaco Industries, Inc.
3837 W. Lake Street
Chicago, IL 60624

Ford Industrial Engine Oper.
Division - Ford Motor Co.
300 Renaissance Center,
Suite 1800
P.O. Box 43338-T
Detroit, MI 48243

Handler Manufacturing Co., Inc.
612 North Avenue E.
Westfield, NJ 07090

Hansford Rapid Check
3112 Winto Rd., South
Rochester, NY 14623

Hebb Leather Co., Inc.
33 Water Street
Danvers, MA 01923

Hild Floor Machine Co., Inc.
5339 W. Lake Street
Dept. TR
Chicago, IL 60644

Hurco Manufacturing Co., Inc.
6602 Guion Rd.
Indianapolis, IN 46268

Indesco Products, Inc.
400-T Belden Avenue
Addison, IL 60101

The Kent Company
2312 Industrial Parkway
Elkhart, IN 46515

Koch Supplies, Inc.
1413 W. 29th Street
Kansas City, MO 64108

Koh-I-Noor Rapidograph, Inc.
100-T North Street
Bloomsburg, NJ 08804

LIST OF PARTICIPATING MANUFACTURERS AND EMPLOYERS
(Continued)

Lauence, C. R., Co., Inc.
P.O. Box 21354T
Los Angeles, CA 90021

Lee, K. O. Company
Industrial Division
210 S. Harrison
Aberdeen, SD 57401

H. Maimin & Co., Inc.
119-A West 40th Street
New York, NY 10018

Manufacturing Technology, Inc.
Sub. of Adams Engineering, Inc.
P. O. Box 10
230 W. McKinley Avenue
Mishawaka, IN 46544

Mayline Co., Inc.
627 N. Commerce St.
Sheboygan, WI 53081

Medeco Security Locks, Inc.
U.S. Rte. 11W
Salem, VA 24153

Merican Curtis Inc.
1717 Rittenhouse Square
Philadelphia, PA 19103

Metal Welding & Supply Co.
5555 Tilghman St.
Allentown, PA 18103

Miller Electric Manufacturing Co.
Dept. TR
P.O. Box 1079
Appleton, WI 54912

The National Super Service Company
1952 North 13th Street
Toledo, OH 43624

New Hermes, Inc.
Dept. TR-20 Cooper Square
New York, NY 10003

Nuex Disc. Inc.
P.O. Box 661013-T
Miami, FL 33166

O'Brien, Larry Dental Manf.
P.O. Box 41538
Tucson, AZ 85717

Ogden Food Service Corp.
3660 S. Lawrence
Philadelphia, PA 19148

Optical Gaging Products, Inc.
850 T-R Hudson Avenue
Rochester, NY 14621

Parker - Hannifin Corp.
17325 Euclid Avenue
Cleveland, OH 44112

Peabody International Corp.
Box 650
Winfield, KS 67156

Peco Controls Corp.
450-1 Montagne Expressway
Milpitas, CA 95035

Pipe Systems, Inc.
1533-D Fenpark Drive
St. Louis, MO 63026

Precision International Corp.
105T Old Windsor Rd.
Bloomfield, CT 06002

Product Design & Development
401 S. George
York, PA 17403

LIST OF PARTICIPATING MANUFACTURERS AND EMPLOYERS
(Continued)

Reflange, Inc.
5201 Mitchelldale St. B-9
Dept. TR
Houston, TX 77092

Roundup Food Equipment Division
A. J. Antunes & Co.
1045 W. National Avenue
Dept. TR
Addison, IL 60101

SWS, Incorporated
203 Court Street
Binghamton, NY 13902

Siemens Medical Laboratory
2404-T N. Main
Walnut Creek, CA 94596

Simpson Electric Co.,
Division of American Gage
and Machine Co., Sub. of
Katy Industries, Inc.
853 Dundee Avenue
Elgin, IL 60120

Slater, N. G. Corp.
230 W. 19th Street
New York, NY 10011

South Bend Lathe, Inc.
500 West Sample Street
South Bend, IN 46621

Stork Food Machinery, Inc.
P.O. Box 816-T
Somerville, NJ 08876

Tri-State Leather Co.
1321 5th Ave.
Pittsburgh, PA 15219

Tweco Products, Inc.
Box 12250-T
Wichita, KS 67277

Wallace Supplies Manufacturing Co.
1308 W. Diversey Parkway
Chicago, IL 60614

Warner Fiberglass Products
P.O. Box 106-T
Belding, MI 48809

Welders Supply Inc.
4501 North Howard St.
Philadelphia, PA 19140

R. D. Werner Co., Inc.
77 Osgood Rd.
Greenville, PA 16125

Westinghouse Electric Corp.
Process Equipment Dept.
Sykesville Operations
P.O. Box 300
Sykesville, MD 21784

Wheeler Manufacturing Corp.
P.O. Box 688-TR
Ashtabula, OH 44004

White, S. S., Industrial Products
Pennwalt Corp.
151-T Old New Brunswick Rd.
Piscataway, NJ 08854

Young Windows, Inc.
799 Brook & Colwell Rd.
Conshohocken, PA 19428

TABLE OF CONTENTS

	Page
FORWARD	iii
ACKNOWLEDGEMENTS	vii
DISCLAIMER	ix
LIST OF PARTICIPATING SCHOOLS	x
LIST OF PARTICIPATING PUBLISHERS	xi
LIST OF PARTICIPATING MANUFACTURERS AND EMPLOYERS	xii
LIST OF FIGURES	xx
SECTION	
I. READABILITY	1
Readability Procedures	4
Instructions for Calculations	11
Exercise A	15
Samples: How Selected and How Many	19
Exercise B	21
The Problem with Readability Analysis	23
II. CLOZE PROCEDURE	29
Student Reading Ability	31
Exercise A	39
Case Grammar and the Cloze Procedure	43
Exercise B	45
III. INFORMAL ASSESSMENT	47
Procedure	49
Purpose	50
Administration	51
Scoring and Reporting	52
Assessments	53
Assessment One -- Vocabulary	54
Sample Answer Sheet	60
Suggested-approximate answers	63
Assessment Two -- Comprehension	65
Sample Answer Sheet	72
Suggested-approximate answers	76
Assessment Three - Study/Reading Skills	79

TABLE OF CONTENTS (Continued)

SECTION		Page
IV.	INTRODUCTION TO THE GUIDE	81
	Reading the Vocational Text/Skill Presentation	83
	Purpose	83
	Organization	83
V.	DEVELOPING VOCABULARY SKILLS	85
	Contextual Analysis	87
	Formal Definitions	88
	Exercise A	88
	Synonyms	89
	Exercise B	89
	Inferential Clues	91
	Exercise C	92
	Illustrations	93
	Exercise D	96
	Glossaries	99
	Exercise E	99
	Contextual Analysis	100
	Formal Definitions	100
	Synonyms.	100
	Inferential Clues	101
	Illustrations	101
	Glossary	102
	Procedures	102
VI.	DEVELOPING COMPREHENSION SKILLS: THE PARAGRAPH	105
	Paragraph Subject	108
	Exercise A	108
	Paragraph Main Idea	109
	Exercise B	110
	Paragraph Supportive Information	112
	Exercise C	112
	Paragraph Comprehension and Illustrations	113
	Exercise D	118
	Procedures	124
VII.	DEVELOPING COMPREHENSION SKILLS: RECOGNIZING AND RECORDING COMPLEX INFORMATION	127
	Classification	129
	Exercise A	133

TABLE OF CONTENTS (Continued)

SECTION		Page
VII.	DEVELOPING COMPREHENSION SKILLS: RECOGNIZING AND RECORDING COMPLEX INFORMATION	
	Comparison	134
	Exercise B	136
	Cause and Effect	138
	Exercise C	141
	Exercise D	143
	Procedures	144
VIII.	DEVELOPING STUDY/READING SKILLS	145
	Purpose	147
	Survey	153
	Question	153
	Read	154
	Recite	154
	Revise	154
	Review	155
	Benefits of the SQ4R	155
	Teaching the SQ4R	156
	Study Reading Skills	157
	Exercise - Suggested Reinforcement Activities/Textbook	157
	Procedures	166
IX.	GUIDELINES: MAKING A READING ASSIGNMENT	167
	Discussion	171
X.	FURTHER SUGGESTIONS: READING SKILLS DEVELOPMENT	173
	BIBLIOGRAPHY	179

LIST OF FIGURES

		Page
Figure 1:	Sample Readability Graph	7
Figure 2:	Graph for Estimating Readability	8
Figure 3:	Flesch Readability Formula Procedure	10
Figure 4:	Sample with Word Count Over Words	12
Figure 5:	Sample Text with Syllables Marked	14
Figure 6:	Sample Graphs of GRL	20
Figure 7:	Readability Record	22
Figure 8:	Dowel Bar Projection Substitution Cloze Test	33
Figure 9:	Lathe Cutterhead Setup Cloze Test	36
Figure 10:	Illustrations	94
Figure 11:	Illustrations	115
Figure 12:	Illustrations	116
Figure 13:	Illustrations	117
Figure 14:	Modified Outline Chart	132
Figure 15:	Comparison Chart	135
Figure 16:	Cause and Effect Chart	139

SECTION 1
READABILITY

In order to plan for intervening in situations of reading deficiency, several pieces of information are required. First, it must be known how urgent the need to read actually is, in the context of both curriculum and occupational requirements. This does not suggest that reading, in the general literacy sense, may not be important. Educators clearly recognize that reading ability is crucial if learning is to occur. What this first question addresses is an examination of objectives and their component tasks to ascertain how much reading is required to complete the tasks and, ultimately, the objectives of the course.

Although there has been little research to date to distinguish between curricular and occupational reading requirements it is not difficult to visualize differences between textbook reading and, for example, manufacturers maintenance manuals. Effectively, there are two kinds of reading: that which is required to read the textbooks (curricular) and that required to read the manufacturer's instructions (occupational). Previous research (Thornton, 1977; 1979; 1980; 1981; Thornton, Waters, and Lee, 1980) suggests that there could be significant differences in the readability level of sections of textbooks dealing with specific tasks and the readability level of literature pertaining to the performance of those tasks.

It is a fact that reading literature peculiar to an occupational specialty at least implies that some form of reading is a vocational skill. Thus, the second bit of information must be collected. It must be known (or decided) if the teacher, the school, and the

school district intend to address reading within the vocational curriculum or as prerequisite skill. If reading is to be dealt with in the vocational curriculum, then all students must receive some form of vocational reading instruction. If, however, reading skill is envisioned to be prerequisite then the thrust of reading in vocational settings would be toward dealing with deficiencies. The strategies, in the latter situation, would be individualized and delivered on a case by case basis.

The previous two pieces of procedural information are fairly general; the third and fourth are specific. The third deals with how difficult literature in a specific occupational curriculum is to read. What is the readability level? The fourth deals with how able students are in terms of reading ability. Can students read literature necessary to succeed in a vocational program? We shall deal with these issues separately.

Readability Procedures

Readability procedures are devices to estimate the grade reading level (GRL) of selected pieces of literature. In other words, a readability analysis determines the approximate GRL a person must possess in order to read the literature analyzed. Note the underlining of estimate and approximate. It must be cautioned that, although these procedures have been validated by extensive research, they are not the sole determinants of readability. Muncrief (1975) discussed a variety of other considerations that

are involved in readability assessments. For our purposes of matching literature assessment to student ability an index of readability is a useful measure.

There is a second caution needed about readability procedures. Preliminary results of current research (Thornton, 1981) brings up serious questions about trying to find an average readability level of occupational literature. For example, what does it mean that the average (the word "mean" is normally substituted for the word "average") readability level of a textbook is ninth (9th) grade? Because the word average or mean is used, it can be assumed that some of the literature is higher than ninth and some of it lower. What the average does not tell us is the range of readability levels and the concentration (mode at any level) of readability level.

In order to make sense out of that argument, a little must be known of how readability assessments are done. When analyzing a textbook (or any other lengthy piece of literature) random samples are selected. These samples are analyzed and an average of all of their readability levels is calculated. That average is the mean readability level of the literature. We will get more explicit about how this is done in the next section.

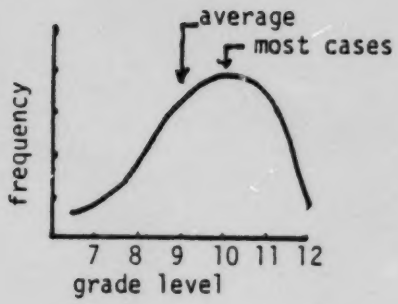
To point out the problm with using the mean (average) some hypothetical samples have been graphed below. The graphs show the curve which would result if the frequencies of grade level of samples were plotted on the graph. The vertical axis of the

graphs represents the frequency that samples were found to be at a particular grade level. The horizontal axis represents the specific grade levels. (See Figure 1)

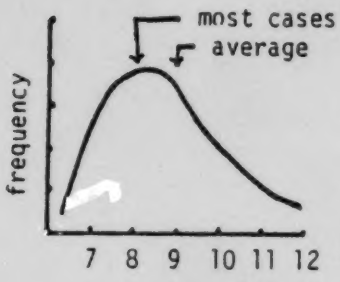
All of the preceding graphs are of books at the ninth grade readability level. But they all differ in the concentration (mode) of levels. The point here is simply that the mean or average can be a deceptive statistic. The analysis can still be useful, providing the results include the range and distribution of readability scores sampled.

Two readability procedures will be discussed: (1) Fry procedure (See Figure 2); and (2) Flesch procedure (See Figure 3).

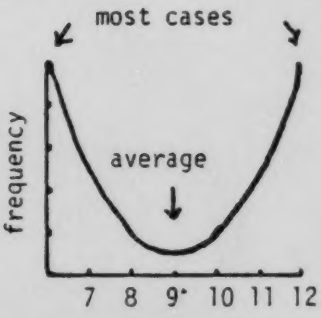
Figure 1: Sample Readability Graph



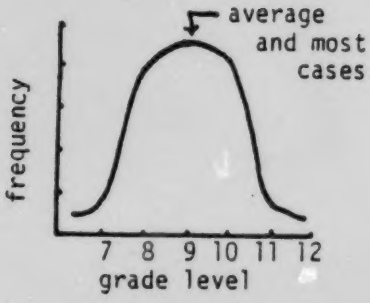
(most cases above 9th)



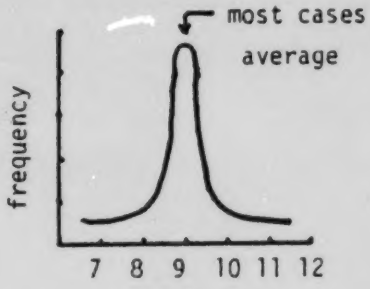
(most cases below 9th)



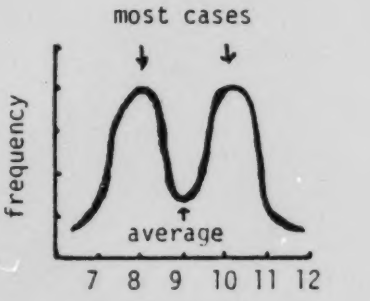
(most cases at highest and lowest levels)



(most cases at 9th substantial variability)



(most cases at 9th slight variability)



(most cases one grade higher and lower than average)

Figure 2: GRAPH FOR ESTIMATING READABILITY
by Edward Fry, Rutgers University Reading Center, New Jersey
Average number of syllables per 100 words

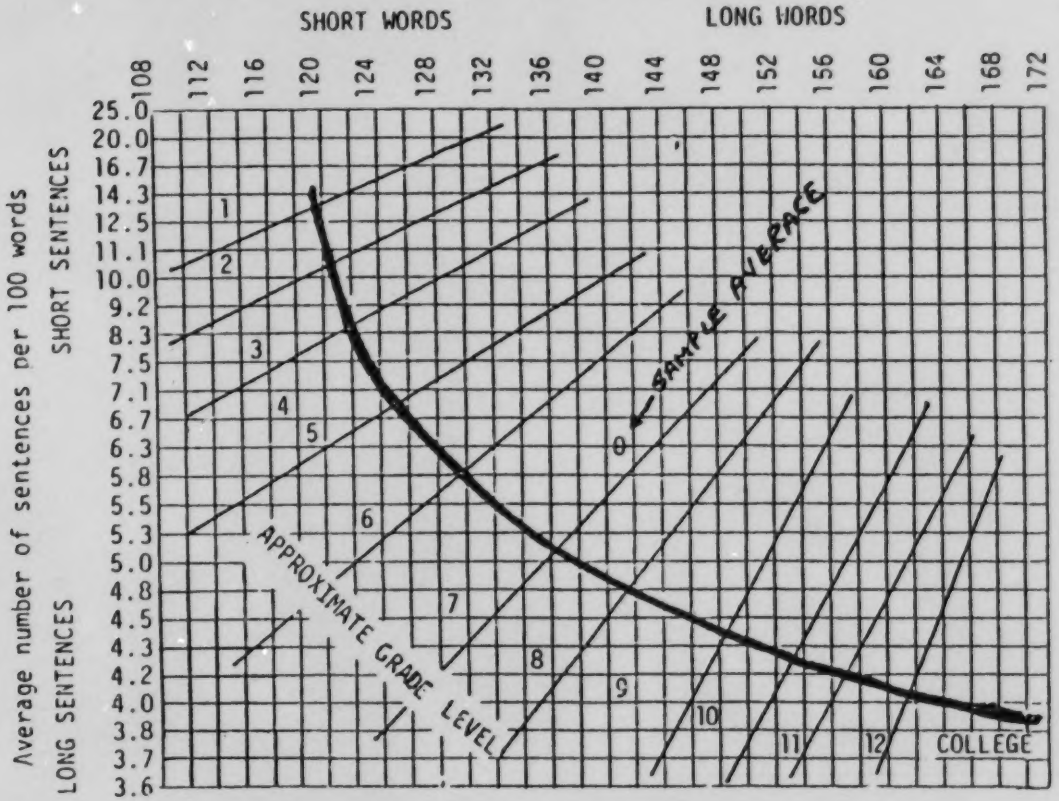


Figure 2 (Continued)

Directions: Use a stratified random procedure, at least five percent for books, more for shorter materials. For example: If a book is 350 pages long, five percent equals 17.5. 350 ÷ 17.5 equals 20. Select a starting number, for example: 6. The first sample page is 6; then 26; then 46; then 66; etc. If one of the pages has no text proceed one page at a time forward until a page is found from which a sample can be taken.

From each of these pages select 100 word passages (alternate positions on page from which taken. For example: beginning, middle, ending). Then plot the syllables and sentences for each sample. This will illustrate the range of readability for the literature being analyzed.

Example:

	Syllables	Sentences
First 100 Words	124	6.6
Second 100 Words	141	5.5
Third 100 Words	158	6.3

(For further information and validity data, see April, 1968 Journal of Reading and March, 1969 Reading Teacher.)

Figure 3: FLESCH READABILITY FORMULA PROCEDURE

There is one readability procedure that is easily used with the assistance of a simple calculator. The Rudolph Flesch (1949) Readability Formula involves a count of the syllables in the sample and words per sentence in conjunction with a mathematical formula. The result is a "Reading Ease Score" which translates into grade reading level.

I. 1. Count the words in the sample (100 words or more, if available).
2. Count the number of sentences.
3. Divide the total number of words by the total number of sentences.
4. Multiply that total (average number of words in a sentence) by 1.015.

II. 1. Count the syllables in the sample.
2. Multiply the number of syllables by 100.
3. Divide that total by the number of words in the sample.
4. Multiply that total by .846.

III. Add I and II.

IV. Subtract III from 206.835.
That is the reading ease score. It translates accordingly:

R.E.Score	Grade	R.E.Score	Grade
115-120	1	80- 89	6
110-114	2	70- 79	7
105-109	3	60- 69	8.5
100-104	4	50- 59	11
90- 99	5	30- 49	14.5
		0- 29	College Grad.

Flesch, Rudolph. The Art of Readable Writing. New York: Harper and Brothers, 1949.

The textbook sample in Figure 4 demonstrates the rules.

Instructions for Calculations

WORD COUNT - Fry: Count all words up to 100 words (may end in partial sentence). Flesch: Count all words up to approximately 100 (end of full sentence).

Numbers - such as 30, 1951, 27-A, L78G are each counted as one word.

Hyphenated words - one word.

Abbreviations - one word.

Acronyms - such as PVA, NSU, USA, AVA are each counted as one word.

SENTENCES - Fry: Count the sentences and determine the tenth of a sentence when ending in a partial sentence. Flesch: Count all sentences.

Headings (paragraph headings) - one sentence.

Parenthetical expressions - (enclosed in brackets) is one sentence even if contained in another sentence.

Semi-colon or colon - If there is a semi-colon or colon in what we usually consider a sentence, that is considered to be another sentence. The easiest way to handle that is to count one sentence overall and add one sentence - count for each colon or semi-colon in the sentence.

RECORDING - Fry: Write down the number of sentences per 100 words. In the example the 100th word is "can." There are 6 full sentences, plus the partial sentence ending in "can." There are 15 words up to and including "smaller" and 20 words in the sentence.

FIGURE 4: SAMPLE WITH WORD COUNT OVER WORDS

1 2 3 4
USING A DADO HEAD

5 6 7 8 9 10 11 12 13 14
THE DADO HEAD CAN BE USED TO CUT DADOS, GROOVES,

15 16 17 18 19 20 21
LAP JOINTS, RABBETS, AND INTERLOCKING JOINTS. THE

22 23 24 25 26 27 28 29 30 31
STOCK CAN BE HELD AND CONTROLLED WITH THE FENCE OR

32 33 34 35 36 37 38
MITER GAUGE, USED SEPARATELY OR IN COMBINATION.

39 40 41 42 43 44 45 46 47 48
TO CUT A GROOVE, RAISE THE DADO HEAD TO THE

49 50 51 52 53 54 55 56
CORRECT HEIGHT AND ADJUST THE FENCE. FEED THE

57 58 59 60 61 62 63 64 65
STOCK THROUGH THE MACHINE AS SHOWN IN FIG. 12-33.

66 67 68 69 70 71 72 73 74
SINCE YOU ARE REMOVING A LARGE AMOUNT OF WASTE,

75 76 77 78 79 80 81 82 83 84
FEED THE WORK SLOWER THAN WHEN USING A REGULAR SAW

85 86 87 88 89 90 91 92 93
BLADE. IF THE GROOVE DOES NOT CONTINUE ALL THE

94 95 96 97 98 99 100 101 102 103 104
WAY ALONG THE PIECE, A STOP CAN BE PRESET ON THE

105
FENCE.

(WAGNER, W., 1978, P. 177)

Thus there are 6.8 sentences per 100 words. Flesch: Count to the end of the sentence in which the 100th word occurs. Therefore, there are 105 words and 7 sentences. Enter these figures on the form and complete the math involved.

SYLLABLES - Syllables are counted in the same way for each procedure. An easy way is to count only those syllables over 1 for each word. For example:

The da/do (1) head can be used to cut da/dos (2), grooves, lap joints, rab/bets (3), and in/ter/lock/ing (4 5 6) joints.

Complete the counting for the entire passage in the same manner. Your total then is added to the total number of words (100 for Fry; 105 for Flesch, in this example). That gives you the total syllable count.

RECORDING - Fry: Write down the total number of syllables. On the graph plot the total syllables (across) to the number of sentences per 100 words. That will give you the approximate readability level of that passage. Flesch: Write down the number of syllables in the space on the form and complete the mark as noted. Then add x and y and subtract that figure from 206.835. That is the Reading Ease score and translates to grade level on the chart.

The total sample syllable count and results for Flesch and Fry methods follow in Figure 5.

FIGURE 5: SAMPLE TEXT
WITH SYLLABLES MARKED

THE DA/DO HEAD CAN BE USED TO CUT DA/DOS, GROOVES, LAP JOINTS, RAB/BETS, AND IN/TER/LOCK/ING JOINTS. THE STOCK CAN BE HELD AND CON/TROLLED WITH THE FENCE OR MI/TER GAUGE, USED SE/PAR/ATE/LY OR IN COM/BI/NA/TION.

TO CUT A GROOVE, RAISE THE DA/DO HEAD TO THE COR/RECT HEIGHT AND AD/JUST THE FENCE. FEED THE STOCK THROUGH THE MA/CHINE AS SHOWN IN FIG. 1/2-3/3. SINCE YOU ARE RE/MOV/ING A LARGE A/MOUNT OF WASTE, FEED THE WORK SLOW/ER THAN WHEN US/ING A REG/U/LAR SAW BLADE. IF THE GROOVE DOES NOT CON/TIN/UE ALL THE WAY A/LONG THE PIECE, A STOP CAN BE PRE/SET ON THE FENCE.

Note that for numbers and acronyms, each letter (number) counts as a syllable.

(WAGNER, W., 1978, P. 177)

The following results were obtained from readability analyses of the preceding sample.

Fry:

100 words

6.8 sentences

131 syllables

6th grade

Flesch:

105 words

7 sentences

137 syllables

R.E. Score 86.06

6th grade

Exercise A:

Following are three examples selected from other sections of the same literature. Practice the procedure, marking syllables and sentence count directly on the samples.

Exercise A Sample 1

Single-End Tenoners

The standard design of a single-end tenoner consists of two tenoning heads, two coping heads, a cut-off saw and a movable carriage, Fig. 14-40.

In operation, the stock is clamped or held to the carriage and moved forward through the tenoning heads which make the cheek and shoulder cuts. It then passes by the coping heads which are mounted on vertical arbors and form contours on the shoulders if it is necessary for them to fit over molded edges. Finally the stock moves by the cut-off saw where the tenon is cut to length.

The cutting heads are powered by individual motors and can be adjusted to various vertical and horizontal positions. (Wagner, W., 1978, pp. 228-229)

Exercise A Sample 2

Using the Router

The router motor revolves in a clockwise direction (when viewed from above) and therefore should be fed from left to right when making a cut along an edge facing you. When cutting around the outside of oblong or circular pieces, always move the machine in a counter-clockwise direction.

The rate of feed will vary with the hardness of the wood and size of cut. Routers have an induction motor which will slow down somewhat under load. Excessive loss of speed indicates too heavy a cut. When the work is heavy, it is best to reduce the depth of the cut and maintain a good rate of feed. (Wagner, W., 1978, p. 254)

Exercise A Sample 3

Using Disk Sander

The disk sander is used mainly for edge sanding. Hold the work firmly on the table and move it lightly against the disk. Use only the half of the disk that revolves downward past the table. Move the work along this surface and do not hold it at one place or excessive heat will be generated, causing the abrasive to load with gum and pitch. This will shorten the life of the abrasive and also cause burn marks on your work.

Pieces of irregular shapes are usually guided freehand. For accurate work on straight edges, use a miter gauge in the table slot as shown in Fig. 17-4. Other types of guides and auxiliary tables can be used for special work. (Wagner, W., 1978, p. 270)

SAMPLES: HOW SELECTED AND HOW MANY

It is important, if an accurate picture of the literature is to be obtained, that the samples to be analyzed be selected at random. Too many subjective errors would be introduced by merely paging through the book, picking what appears to be representative samples. The easiest way and one that is sufficiently random is entitled a stratified random sampling.

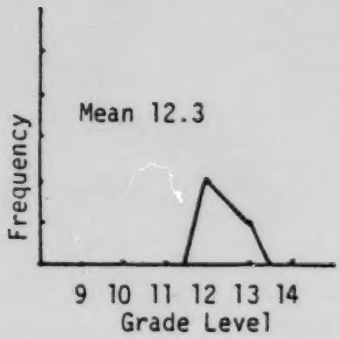
In order to achieve the stratified random sample, it must first be decided how many samples are to be drawn. A useful rule is to select samples from 5% of the pages in the book. Remember, however, that the more samples drawn, the more accurate will be the analysis. That point is demonstrated in the following analyses (See Figure 6) of a textbook under consideration in which 3, 6, 10, 15 were drawn. (Average was used in this case to distinguish between results of analyses in which increasing number of samples were drawn.)

Procedure: Assume a book has 300 pages (not including glossary or index). A 5% sample requires (.05 x 300) 15 samples. To establish the starting page divide the total pages (300) by the total samples required (15). That result is 20. Randomly pick a number from 1-20. This can be done using numbers in a hat. That number is the starting page. Let's assume it is 6. The remainder of the pages are selected by adding 20 to 6, 20 to 26, 20 to 46, etc. until all the samples are drawn.

Figure 6: Sample Graphs of GRL Frequencies: 3, 6, 10, 15 Samples

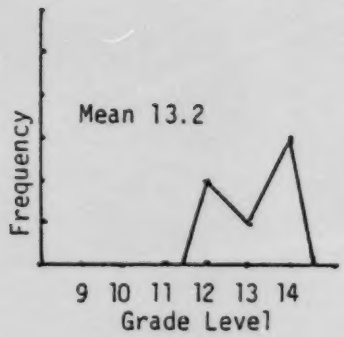
3 Samples

GRL	Freq.
12	2
13	1



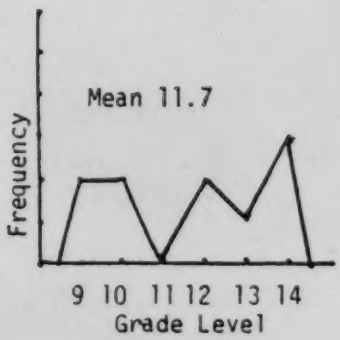
6 Samples

GRL	Freq.
12	2
13	1
14	3



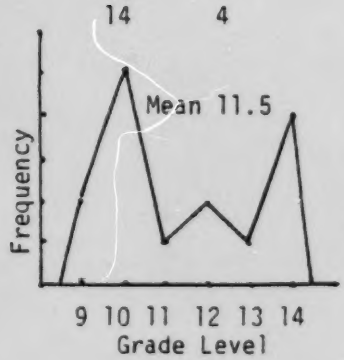
10 Samples

GRL	Freq.
9	2
10	2
12	2
13	1
14	3



15 Samples

GRL	Freq.
9	2
10	5
11	1
12	2
13	1
14	4



Now we know the pages of the book we will use in the analysis. If any of those pages contains no text (some may be pictures or diagrams) move one page at a time forward or backward until text is found. It is also recommended that the sample 100 words be selected alternatively from the beginning (B) and end (E) of the page. Therefore, page 6 would be 6-B (for beginning), page 26-E (for end), page 49-B, etc.

Exercise B:

Compute a stratified random sample schedule for the following:

1. Textbook with 350 pages.
2. Textbook with 1000 pages.
3. Textbook with 525 pages.

If the literature you plan to analyze contains less than 200 pages, but more than 25, select 10 samples. For literature of less than 25 pages, but more than 5, select every other page. For literature less than 5 pages, take a sample of every page.

On the following page (See Figure 7) is a form to assist you in recording your findings. It is always a good idea to keep a file of literature analyzed.

Figure 7: Readability Record

Author(s):

Title of Literature:

Publisher:

Publication Data:

Total Number of pages:

Percent of pages sampled:

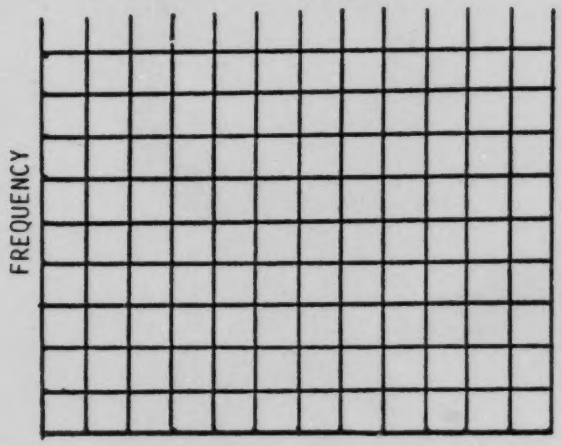
Procedure used:

Page numbers from which samples were taken:

Highest readability:

Lowest readability:

Graph for Plotting Results



(Thornton, Waters & Lee, 1980)

The Problem with Readability Analysis

Earlier it was mentioned that the GRL yield of readability procedures is actually an average (mean). In order for the mean to be an appropriate measure, certain conditions must be met. For example, the range must be closed; there must be a beginning and an end.

Readability yields are not based on a closed range. They begin at an arbitrary point, such as grade 16. Reading occurs before grade 1 and after grade 16, but there are no levels to accommodate that reading. So, the mean is, by definition, inappropriate.

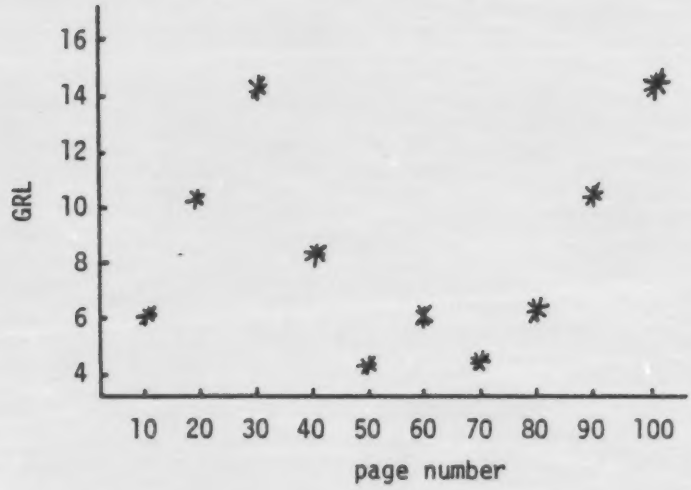
Another problem exists which is more devastating than statistical theory. Readability means assume unimodal distribution and no serious skew. Research attendant to the project (Thornton, 1981) demonstrated that occupational literature is seldom unimodal and, when it is, the distribution is often seriously skewed.

Moving away from statistical talk, what the research found was (1) GRLs were clustered at more than one level, such as at the 10th grade and 14th grade, and (2) when not clustered at more than one level, they contained extreme values which distorted the mean. The result of these conditions is that to report the average grade reading level of a construction trades textbook is nearly useless.

Assume for a moment that a publisher claims a book to be at the 10th grade reading level. What do you now know? Not much! First, readability formulas are accurate to about 1½ grades. Thus a 10th GRL really means 8½ to 11½. Second, the study referred to previously found standard deviations of 2-3 years. So the spread around the mean of 10 is plus or minus 2-3 years. Thus, considering the spread, the information found in a reported 10th GRL, is even more vague. The low end could actually be 5½ and the high end 14½. There is no way to tell.

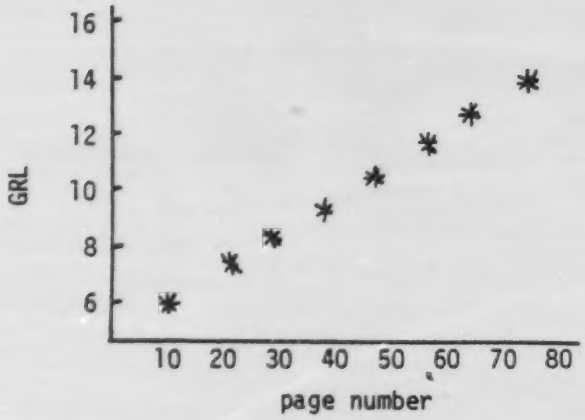
The statistical irregularity can be overcome. Instead of reporting an average GRL, you need to plot the sample GRLs in terms of page numbers in the text analyzed. Actually, this is easier than computing all the statistics mentioned above.

For each sample taken from a textbook plot the results on a graph with the horizontal axis representing page number in the text and the vertical axis being the GRL of that sample. The results would look like the following graph:



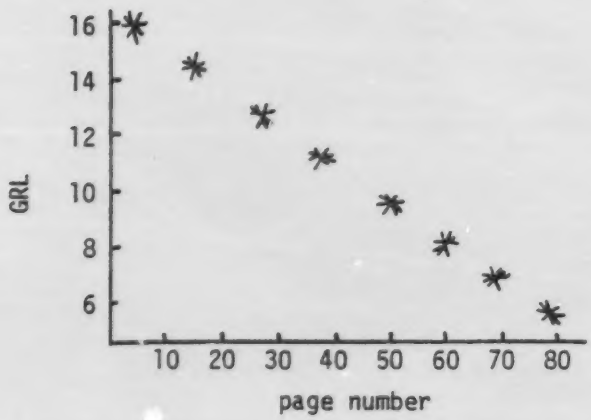
If you know your students have an approximate 8th grade ability, this graph demonstrates that at pages 20, 30, 90 and 100, they will probably have difficulty. The more samples you use, the more specific your information will be. At the problem points, you can intervene with the strategies to be discussed in this guide.

This method of analyzing a text accomplishes something else. Ideally, a textbook should begin at a reasonably low level and proceed to a reasonably high level. So a graph of the results should look like the following graph:



If the graph resulting from your analysis does not show progressive difficulty, the textbook may not be appropriate.

Lets say the graph shows the highest GRL at the beginning and decreasing difficulty thereafter:



Reading deficient students would be faced with the most difficult reading at the first contact with the book. When that happens, many students give up. The book is inappropriate.

It is possible that you have no choice and must use a textbook that is difficult at varying points. In that case, with the graphed reporting procedure, you will know about the difficulty. Where it exists, you can intervene. The mean GRL simply does not give this information.

Very few graphs will result in perfect lines, such as those shown. You must look for a trend, then you must account for any extremes. In any case, the graphed procedure permits locating potential problems.

SECTION 2
CLOZE PROCEDURE

STUDENT READING ABILITY

Diagnostic reading test scores are often available for students in vocational programs. These scores, normally on file at the home school (in the counselors office at the comprehensive high school), are useful indicators of a student's general reading ability. How well they relate to vocational reading requirements is subject to conjecture. There simply has not been a concerted effort to separate vocational reading skill from general literacy skill. Because of these unknowns it is strongly recommended that you not accept a GRL score as final. Standardized reading test scores are useful indicators, but they should be supplemented with teacher made vocational reading tests.

A useful and highly adaptable reading test is the cloze procedure.

> The cloze procedure is an objective measure of language correspondence between reader and writer. It consists of a cloze (word) unit, a single (occurrence) of a successful attempt to reproduce accurately a part deleted from a message, by deciding from the context that remains what the missing part should be (Taylor, 1953).

> The cloze procedure differs from vocabulary contextual texts. Rather than choosing omitted words because of definition and purpose, the cloze units are chosen mechanically; every fifth word, for example, occurring at any point in a continuous passage. The cloze design incorporates control against misrepresenting strength/weakness in content vocabulary as an indication of the test subject's ability/inability to read (Thornton, 1979).

Any piece of literature can be clozed. That includes textbooks, occupational literature, safety messages, codes, medical contraindications, literally anything. The procedure is described below:

1. Select a piece of literature.
2. Leave the first sentence intact.
3. Delete every fifth word.
4. Leave the last sentence intact.
5. Instruct the student to read the entire passage first, then begin filling in the blanks.
6. Instruct the student to be aware when guessing is the rationale for word selection, but to guess when other rationale fails.

Scoring the test is accomplished as follows:

0-39.9% Frustrational level (Student will not be able to read the literature)

40.0-69.9% Instructional level (Student will require intervention to be able to read the literature)

70.0-100.0% Independent level (Student is able to read the literature without intervention)

On the following pages two different cloze tests have been prepared using on-the-job literature. The correct words which have been deleted are listed following each example.

FIGURE 8: DOWEL BAR PROJECTION SUBSTITUTION CLOZE TEST

IN RECENT YEARS, THE USE OF HEADED CONCRETE ANCHORS, DEFORMED ANCHORS AND WIRE FABRICATED INSERTS HAS BEEN CONTINUOUSLY PRESSED INTO SERVICE BY THE CONCRETE INDUSTRY. THE UTILIZATION OF THESE _____ AND ANCHORING DEVICES HAS NOT _____ WITHOUT SOME DEGREE OF _____.

THE SIGNIFICANT REASON FOR _____ GRADUAL ACCEPTANCE OF THESE _____ IS CONTRIBUTED TO THE _____ UNDERSTANDING OF EXACTLY THE _____ SYSTEMS INTERFACE, INTERACTION AND _____ RELATIVE TO VARIED APPLICATIONS _____ AS A RESULT THE _____ QUESTIONS RELATIVE TO OPTIMUM _____ THAT WOULD ALLOW FULL _____ STRENGTHS AT MINIMUM COSTS.

_____ DOCUMENT IS DESIGNED TO _____ ON THE WIRE FABRICATED _____ DEVICE AND ITS PRACTICAL _____ IN REGARD TO DOWEL _____ PROJECTIONS. WIRE FABRICATED INSERTS _____ CONTINUOUS THREADED LAGSTUD ARE _____ USED DAILY TO REPLACE _____ BAR PROJECTIONS.

FIGURE 8 (CONTINUED)

THE DEVELOPMENT _____ THIS TECHNIQUE HAS BEEN _____ DERIVED AND EMPIRICALLY CONFIRMED.

_____ EQUATIONS, TABLES AND CHARTS _____ IN THIS DOCUMENT ARE _____ INTENDED FOR UNIVERSAL APPLICATION. _____, THIS DATA PROVIDES A _____ GUIDE TO GOOD ENGINEERING _____ RELATIVE TO DOWEL BAR _____ SUBSTITUTION TECHNIQUES.

RICHMOND HAS _____ NUMBEROUS PIECES OF HARDWARE _____ ACHIEVE AN ECONOMICAL, SAFE _____ ESTHETIC SOLUTION TO THE _____ BAR PROJECTION PROBLEM. THE PHOTOS SHOWN IN THIS DOCUMENT ILLUSTRATE SOME OF THE ACTUAL MECHANICAL ANCHORAGE APPLICATIONS.

(RICHMOND, 1975, P. 1)

FIGURE 8 (CONTINUED)
WORD LIST

INSERTS	DEVELOPMENT	THE
BEEN	THIS	FOUND
HESITATION	CONCENTRATE	NOT
THE	INSERT	HOWEVER
TECHNIQUES	APPLICATION	SOUND
INCOMPLETE	BAR	PRACTICES
INSERT/ANCHOR	AND	PROJECTION
FUNCTION	BEING	SUPPLIED
AND	DOWEL	TO
UNKNOWN	CONCERNING	AND
CONFIGURATIONS	THEORETICALLY	DOWEL

FIGURE 9: LATHE CUTTERHEAD SETUP
CLOZE TEST

PATTERN MAY BE OBTAINED BY TURNING FIRST SAMPLE ON HAND LATHE AND CUTTING IN HALF WITH A BAND SAW, OR BY LAYING OUT FULL SIZE PATTERN ON A WOODEN TEMPLATE WHICH WILL FIT IN THE KNIFE MARKING MACHINE.

ALWAYS BEGIN ASSEMBLING THE _____ WITH SHORT CARRIERS AND _____ KNIVES AT THE LARGEST _____ OF TURNING. THIS KEEPS _____ CUTTING CIRCLE TO A _____ AND MAKES THE STRONGEST _____.

SHEAR SHOULD ALWAYS START _____ THE LARGEST DIAMETER OF _____ AND EXTEND TO THE _____ DIAMETER. THIS PROVIDES A "_____ HILL" CUT. BASIC RULE: _____ OF KNIFE SHOULD ALWAYS _____ SUCH THAT IT WILL _____ SHEAR AGAINST THE GRAIN.

_____ ALL CARRIERS BEFORE ASSEMBLY.

_____ LONG REACHING CARRIERS RATHER _____ WIDE KNIVES WHENEVER POSSIBLE.

_____ GIVES STRONG SUPPORT TO _____ KNIVES CLOSE TO THE _____ EDGE AND MINIMIZES STRAIN _____ THE KNIFE.

FIGURE 9 (CONTINUED)

ASSEMBLE CARRIERS _____ HEAD AND SELECT KNIFE _____ TO CORRESPOND WITH THE _____ OF THE CUT TO _____ MADE. WHERE THERE ARE _____ NUMBER OF SMALL MEMBERS, _____ CARRIERS MUST BE USED.

_____ COMBINATION KNIFE MARKING MACHINE _____ SETUP STAND SHOULD BE _____. THE KNIFE MARKING MACHINE _____ A SIMPLE AND EFFICIENT _____ FOR MARKING KNIVES FOR _____. KNIFE BLANKS ARE PLACED _____ THE HOLDERS AND COATED _____ CHALK AND MARKED. KNIVES ARE REMOVED FROM CARRIERS, GROUND, AND THEN SET UP. (ANDERSON KNIFE, 1969, P. 11)

FIGURE 9 (CONTINUED)
WORD LIST

SETUP	NOT	A
SHORT	BALANCE	NARROW
PART	USE	A
THE	THAN	AND
MINIMUM	THIS	USED
HEAD	THE	OFFERS
AT	CUTTING	METHOD
TURNING	ON	GRINDING
SMALLEST	IN	IN
DOWN	BLANKS	WITH
SHEAR	SIZE	
BE	BE	

Exercise A

Cloze the following passage and write out the instructions to the student regarding how they should proceed.

The purpose of the foundation drain is to remove the water which tends to collect under the basement floor and outside the foundation wall. If this water is not removed, the basement walls and floor are likely to be damp. Even worse, the walls may be damaged by hydraulic pressure from the water on the outside.

In locations where the storm sewer entry is above the foundation drain it is necessary to install a sump pump to lift water from the sump into the storm sewer. The sump pump is turned on automatically when the water in the basin reaches a certain level. When designing the foundation drainage system it will be necessary to consult the electrical plans to make certain that electrical service has been provided to power the sump pump.

When the sewer drain is at a lower level than the foundation drain, no sump pump is needed. The ground water will flow into the sewer by gravity.

Other provisions for storm water removal include:

1. Installing drains to each gutter downspout.
2. Providing drains in stairwells and in some cases, window wells.
3. Installing drains outside of garage doors if the driveway slopes toward the building.

(Blankenbaker, 1978, p. 116)

Exercise A: Answer Sheet

Instructions:

Words List:

The cloze procedure can also be used as a teaching technique. A variety of cloze modifications are useful for vocational teachers.

The changes in the procedure reflect the purpose of the exercise. If, for example, an occupational instructor wishes to highlight functions of the skeletal system and be certain that the student reading the literature understands what is being read, the passage can be "clozed," deleting those words which are critical to the comprehension. The following spray painting passage with "instructional modification" words (to be deleted) underlined illustrates the technique:

SAMPLE: INSTRUCTIONAL MODIFICATION CLOZE

Electrostatic spraying with a hand-held gun requires extra care. The gun, the piece to be sprayed, and all conductive equipment must be grounded to prevent sparking. While you are spraying, the gun must be held twice the sparking distance or at least 12 inches from the work and other conductive surfaces.

All electrical equipment must be in another room or well away from the spraying area (at least 20 feet) or it must be of the type approved for hazardous locations and explosive areas. (HEW Publication, NIOSH 76-178, p. 8)

Another modified cloze teaching technique is the "lexical cloze." Lexical is defined as relating to words of a language. The lexical cloze involves deletion of words according to the kinds of words they are, such as nouns, verbs, adjectives, etc. A later segment of this article develops case grammar modifications utilizing the lexical cloze, establishing applicability for occupational education reading intervention. The example which follows illustrates use of verb deletions in a carpentry application. The words to be deleted have been underlined:

GUMMING

Repeated filing is bound to make the teeth shallow and grinding them deeper with a grinding wheel is known as gumming. A saw does not need to be gummed every time it is rounded and set and filed.

When gumming by hand, to insure that you will gum all the teeth the same depth so the saw will be in balance, it is an easy matter to make a simple wooden compass with a round piece of wood to fit the center-hole of the saw. Drill a hole to hold a blue pencil and describe a circle the proper distance below the teeth. Then gum until the bottom of all the gullets just touch the edge of the circle.

> When gumming with a grinding wheel, the operation should be performed by going around the saw several times. Do not crowd the wheel and take too deep a cut. Doing too much work at one time will heat the gullets and stretch the rim so that the saw will need hammering to restore the original tension. Crowding the wheel as to blue and burn the gullets is sure to injure the saw, often glazing it so hard that a file will make no impression on it. From these hard spots small cracks begin, invisible at first to the eye, but gradually enlarging until they become dangerous fractures. (Gumming. Care and Use of Circular Saws. Fitchburg, MA: Simonds Cutting Tools, Wallace Murray Corporation, 1979, p. 14)

Note that only the verb's involving an action on the part of the student have been marked for deletion. It is the activity that is emphasized in this reading intervention exercise.

When used as teaching technique, the cloze procedure is easily adapted to provide for increasing degree of difficulty. Often vocational students have experienced a history of failures in reading. The pattern is conducive to diminished motivation in an attempt to read. In order to break the pattern and increase the likelihood of a motivated reader, a pattern of reading successes is useful. Literature of any level of readability can be clozed. Thus, vocational literature at a low readability level can be used for those students who need a success stimulus. In addition, for teaching purposes, synonymous or words close to the correct word can be accepted. The number of clozed words can be decreased instead of following a schedule. The next example illustrates this point:

SOLID VINYL SOFFIT AND FASCIA SYSTEMS

1. The Bird soffit system utilizes a Quarter-Round Molding accessory--solid or perforated ventilating panels--and either an "F" Channel or a ½ inch "J" Channel.

2. In every case, the object is to provide two parallel slots--one on the house and the opposite side at the fascia--to allow for the insertion of soffit panels.

3. Either the Quarter-Round Molding or the "F" Channel may be used to provide a channel support at the wall. When the soffit area is open, the "F" Channel can be nailed directly to the wall. The Quarter-Round Molding will require a nailing support.

4. Where the soffit area is closed the Quarter-Round Molding can be nailed to the wooden soffit provided that it is level with the "F" Channel on the bottom of the fascia.

5. The "F" Channel is installed on the outer bottom edge of the fascia board to provide support for the outer edge of the panel.

6. The soffit panel is then cut to length. When you measure between channels, be sure to subtract one quarter inch for expansion.

(Solid Vinyl Soffit . . . , 1978

For the word "slots," the student would be correct inserting "holes," for example. Note that only six deletions have been made and all are heavily clued.

CASE GRAMMAR AND THE CLOZE PROCEDURE

Gibson and Levin (1979) describe Fillmore's theory of case grammar. ". . . which imaginatively combines syntactic and semantic features." The study of meanings (semantics) and the orderly system of words (syntax) combine in Fillmore's Case Concepts (Brown, 1973). The theory of case grammar is easily adapted to teaching techniques

using the cloze procedure. The following illustrations are from Wagner's Modern Carpentry (1979).

Agentive (A) - "The typically animate, perceived instigator of action."

Some applicators of asphalt shingles perfer to use a woven or closed-cut valley design, especially on re-roofing work (p. 190).

Instrumental (I) - "The inanimate force or object casually involved in the state or action named by the verb."

In modern construction, pneumatic powered staplers are often used to install asphalt shingles (p. 192).

Dative (D) - "The animate being affected by the state or action named by the verb."

Carpenters may be injured by improper lifting or carrying of heavy objects.

Factive (F) - "The object or being resulting from the state or action named by the verb."

Too wide a kerf can result from saw blade chatter.

Locative (L) - "The location or spatial orientation of the state or action named by the verb."

The (radial) arm is attached to a vertical column at the back of the table (p. 38).

Objective (O) - "The semantically most neutral case: anything representable by a noun whose role in the state or action named by the verb depends on the meaning of the verb itself."

Routers are used to cut irregular shapes and to form various contours on edges . . . (p. 35).

Benefactive (B) - "A noun deriving benefit of the action of the verb."

Sharp blades and cutters insure accurate work and make the tool much safer to operate (p. 41).

Comitative (C) - "In accompaniment."

The most vital factor in stair design is the relationship between the rise and (riser) and run (tread minus nosing) (p. 351).

Temporal (T) - "When the verb is accomplished or occurs."

Do not remove any diagonal braces or spacer strips until after their installation is complete (p. 225).

Modified cloze techniques can be used as introductory exercises, included in self-instruction packets, adapted for games, or structured for remedial work. They provide an excellent method of coordinating in-class vocational work and English or remedial reading treatment.

Exercise B

Underline each word in the following passage which could be clozed by Fillmore rules, entering above the word the letter which indicates the rule used.

EXTERIOR WALL FINISH

The term "exterior finish" includes the application of all exterior materials of a structure. It generally refers to the roofing materials, cornice trim boards, wall coverings, and trim members around doors and windows. The installation of special architectural woodwork at entrances or the application of a ceiling to a porch or breezeway area would also be included under this broad heading.

Previous units have described the application of the finished roof and the installation of the trim around windows and outside doors. This unit provides information about the construction and finish of cornice work and the materials and methods used to provide a suitable outside wall covering.

CORNICE DESIGNS

The cornice, also called an eave, is formed by roof overhang and provides a finished connection between the wall and the edge of the roof. It is an important element in the total appearance of a structure and the architectural style will determine to a large extent the design requirements. Fig. 12-1 includes a number of detailed cornice sections secured from architectural drawings of contemporary residential structures.

Diagrams of several closed or "boxed" cornice designs are illustrated in Fig. 12-2. An open cornice is sometimes used, exposing the rafters and underside of the roof sheathing. Wide shade for large window areas, protect the walls, and add to attractiveness of the structure.

The rake is the part of a roof that overhangs a gable. It is usually enclosed with carefully fitted trim members.
(Wagner, 1979, p. 249)

SECTION 3
INFORMAL ASSESSMENT

INFORMAL ASSESSMENT

Prior to the instruction of reading skills with the occupational literature, it is important to know your students' current reading performance. A standardized test is useful as a general screening device and yields composite scores in major skill areas -- e.g. vocabulary and comprehension. Another instrument is needed, however, to assess specific skills within the major skill areas -- e.g. contextual analysis, main idea, cause-effect relationship. The development and use of an informal assessment can meet this need.

Procedure

A. The first step in the development of an informal assessment is the establishing of a hierarchy of critical reading skills in which vocational students should show competence. The skills presented, for example, in this text have been determined as important for effective reading in the vocational materials. Also, the needs of your specific student population must be considered.

B. After determining the skills to be measured, then an order or matrix within each major skill area must be developed. The more reasonable order is proceeding from easy to more difficult.

C. Then the informal measure is designed based on the criteria in items A and B. Extractions from materials (textbook and manufacturer's) to be used in the occupational program

should be used in constructing the questions. Therefore, the questions require practical application of skills with materials students need to read and understand in class. The assessment becomes "tailor-made" to your course.

D. It is helpful to design pre and post assessments with similar levels of difficulty, and which measure the same skills in the same order -- two instruments that are as parallel as possible. These can be compared for program effectiveness and for evaluation of improvement of students' reading skills in your occupational area.

Purpose

The use of the informal reading skills assessment can accomplish three purposes for the vocational teacher:

A. It can be utilized as an identification procedure. After students have taken the assessment, you can recognize more clearly those students whose reading skills are noticeably inadequate. This measure helps you to identify the disadvantaged learner. If a student performs poorly on much of the assessment, he/she will probably have difficulty with your assigned vocational reading materials.

B. It can be utilized as a diagnostic procedure to determine which reading skills will require special attention in your instruction. After the assessment is scored, you

will be able to select those questions which were more frequently missed and identify the specific skills in which students are showing most difficulty.

C. It can be utilized as an evaluation procedure with vocational students growth (both group and individual) in reading skill preformance. This can best be accomplished by using pre and post measures of the assessment. This pre and post testing can be used with a total skills program or can be done with skill segments. The results will be useful to the teacher for evaluating student progress and program effectiveness. The results can be also used as supportive data for reporting course or program success.

Administration

The informal assessment can be administered once or parallel tests can be given for a pre and post testing situation. A pretest is given before instruction and student practice, followed by a parallel posttest. As mentioned previously, the pre and post measures allow for comparison, and student progress and program effectiveness can be more completely evaluated. A single administration can also be beneficial as discussed in the "purpose" section. The results can be used for identification of disadvantaged learners, for identification of skills to be emphasized in instruction, and for information regarding students' reading performance.

Scoring and Reporting

Since the assessments are designed specifically for your program and they are not standardized, the scores can be reported in percentages (number correct divided by number possible). Each item should be assigned a point value with the total equaling 100. The results are best utilized when this is done for each of the major areas -- vocabulary, comprehension and study skills.

Students should be given their scores so they recognize their own reading skill performance. A short reporting form with raw score and percentage provides good record for the student; individual skills tested with a raw score breakdown could be included to provide more specific information.

If you utilize a pre and post testing program, results can be reported in various ways. Students can be given both sets of scores for comparison and evaluation of growth. Data can be recorded to show program performance by: (1) listing all students raw and percentage pre and post scores together in chart form; (2) determining "percentage improvement" by students and recording in table form. An example of item 2 could be:

Comprehension - Test 2 (This can be done for each major area.)

1) 33 possible items

2) Approximate time: 30 minutes

3) Content: Paragraph subject, supporting ideas, main idea, graphics

4) Results: 113 of 129 students showed improvement

Amount of percentage gained from pre to post score	Number of students
1 - 10%	36
11 - 20%	35
21 - 30%	20
31 - 40%	13
41 - 50%	7
50+	2

Scoring the assessments and reporting the results is helpful in many ways. Students can visually see reading performance. You, as vocational teacher, can determine which reading skills need emphasis. Plus, student and program performance can be more clearly seen.

Assessments

Following are three informal assessments, one for each of the major skill areas. Excerpts of occupational literature from varied trades have been utilized. It has been designed so that it can be given to all vocational students, even with the varied occupational material. Critical reading skills for vocational literature have been determined and they provide the structure for the three assessments.

The informal assessments (vocabulary, comprehension, study skills), can be administered as they are, or they can be used as models for your own construction of informal assessments. Sample answer sheets are also included. Plus, suggested "question-weight" is given, according to difficulty of task. This is a guideline; you may devise your own point system.

ASSESSMENT ONE -- VOCABULARY

This activity will help you to measure your present vocabulary performance. Answer as accurately as possible. Please record all responses on the provided answer sheet.

A. Formal Definitions (2 points each definition)

Directions: The following exercise measures your ability to determine the meaning of a word by understanding the formal definition given. Write a definition for each underlined word.

1.) A vocation is a job for which a person is specially trained.

2.) Face-to-face listening, listening done as part of a two-person conversation, and listening done as a member of a small group are all referred to as small-group listening.

3.) Since the goal at this stage of construction is to enclose the structure and make the roof watertight, only those partitions that support the ceiling and/or roof (bearing partitions) are usually installed.

B. Synonyms (1 point for each answer - 7 points total)

This section will measure your ability to determine meaning of a word by locating synonyms -- one word or a small phrase which has a similar meaning and which serves to explain. Write that single word or phrase which is a synonym for the underlined word(s).

1.) One must understand the system to accurately diagnose (identify) mechanical difficulties.

2.) Carbohydrates are classified as monosaccharides, or simple sugars, when they contain one basic sugar unit ($C_6 H_{12} O_6$).

3.) The surface many spall (chip or crumble away) if subjected to moisture and freezing.

4.) Pick out the terms and the appropriate synonyms in this paragraph:

When these lines of force encounter a longitudinal (lengthwise) crack, they lean through and become points of surface attraction for the magnetic powder dusted on the surface. A transverse, or crosswise crack, would not show because the lines of force would be parallel with the crack.

C. Inferential Clues (3 points each definition)

This section will require you to use clues from the surrounding context to determine the meaning of an unfamiliar term. Write a definition for each underlined word by using the clues within the paragraph.

1.) Early Ambulation. It is common practice to get the patient out of bed hours after surgery, instead of keeping him in bed for prolonged periods, which adds to his discomfort and delays his recovery . . . You should remain with the patient the first few times that he is out of bed. Assist him to dangle his feet at the side of the bed for a few minutes so that his circulatory system can adjust to his change of position. When he no longer feels dizzy or light-headed, assist him to stand, take a few steps, and sit in a chair. In the postoperative orders, the patient's doctor will specify when the patient is to be ambulated, how often, for how long a period of time, and with what, if any, limitation.

2.) In planning interior display it is necessary to take into consideration a whole interior and not just an individual display. In order to obtain a harmonizing effect from displays, the interior planning should include decorations, layout, and merchandise displays. Decorations include the lights, fixtures, walls, ceiling and floors. The layout involves the placement of the tables, showcases, racks, and other equipment. The displays involve the actual placing of merchandise on the counters, the floor, the shelves, and in showcases.

3.) Before repainting, the probable cause of the trouble should be ascertained. If it is due to springtime blistering on localized areas on the house in the colder northern states, a more effective vapor barrier is needed. This can be obtained by painting the indoor side of the exterior walls. Two coats of

aluminum paint plus two coats of decorative paint are best for sand-finish plaster. On smooth plaster, a primer-sealer and at least one coat of semigloss paint make a good barrier. Shutting off humidifiers will also help.

4.) For this paragraph, define the underlined word, and list the words of phrases (clues) which helped you to understand the meaning of that word.

Sedation is used for the dental patient to relieve apprehension and fear. The techniques and drugs used do not render the patient unconscious, and their protective reflexes remain intact. The patients, at proper levels of administration, will respond to commands by the dentist and assistant and are able to cough, swallow, breathe, and maintain all physiologic functions at reduced levels.

D. Illustrations (3 points each definition)

The next questions will measure your ability to define words through the use of drawings and photographs.

1.) Look at the drawing carefully. What is the meaning of gesticulating?

The gesticulating speaker communicates her own nervousness.

2.) Use the drawing and the paragraph from a textbook on machining to determine what parallels are.

Parallels, Figure 7-36, can be made from standard steel shapes or from special steel that is heat treated. The heat treated steel is then ground to size. Parallels are helpful for raising work in the vise so drilling can be better observed. Parallels must be located so the drill does not come in contact with them when the drill breaks through.

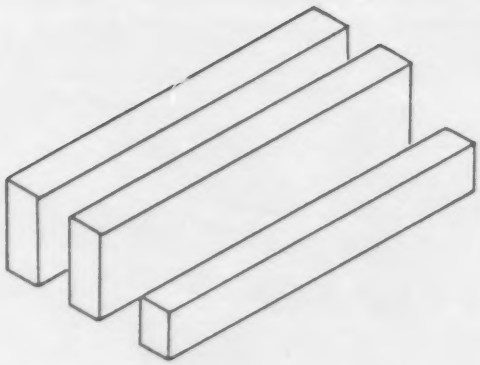
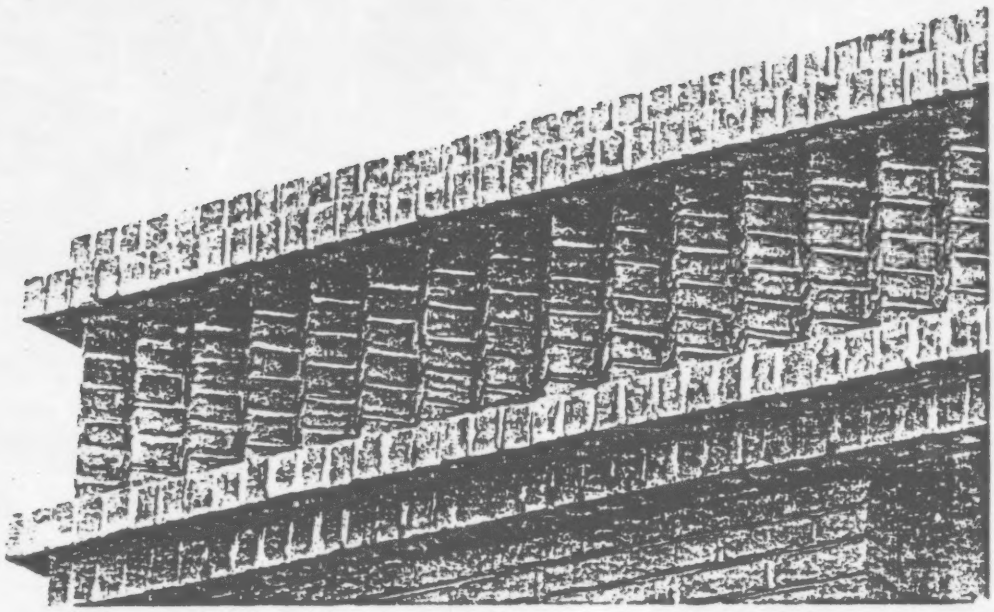


Fig. 7-36. Steel parallels.

3.) Look at the following photograph carefully, What is brick corbelling?



E. Content Vocabulary (4 points each paragraph)

The following section will require you to recognize content vocabulary words. Read each paragraph and list on your answer sheet those words or phrases specific to the given occupation (A) that you would need to know to understand the reading material, and (B) that are common to that occupation.

1.) Occupation: Food Preparation

Originating in many different parts of the world, spices, herbs, and other flavoring agents are parts of plants, flowers, or complete agricultural products, used to add zest to a dish. Although they often were used in the past to mask a taste generated by spoilage or decay of a food, they are presently used (in most cases) to enhance the flavor of a culinary work or to give unusual stimulation to a traditional dish.

2.) Occupation: Welding

The single-bevel T-joint is able to withstand more severe loads than the square T-joint. It can be used on plate thicknesses ranging from 3/8 to 5/8 inch. Plate of greater thickness can be welded with the submerged arc process. Cost of preparation is greater than for the square T-joint, and fitup is likely to take longer. Electrode costs are less.

3.) Occupation: Business/Management Tactics

A lockout is a temporary work stoppage by an employer in an attempt to win a dispute with the employees. In a sense, a lockout is a strike by the employer against the employees because management "locks the gates" and refuses to let workers enter the business. The lockout cannot be used as a device to discourage employees from joining or forming a union, although it was used extensively for that purpose prior to the passage of certain laws. Today employers seldom close their businesses in order to pressure employees to negotiate even though they have the right to do so.

*This assessment has been assigned 49 points. To facilitate scoring, it is suggested to award the extra point to each student or to devise a one-point item.

ASSESSMENT ONE -- VOCABULARY

SAMPLE ANSWER SHEET

Name _____ Date _____

A. Formal Definitions

1.) _____

_____

2.) _____

_____

3.) _____

_____

B. Synonyms

1.) _____

2.) _____

3.) _____

4.) Term _____ Synonym _____

5.) Term _____ Synonym _____

C. Inferential Clues

1.) What is early ambulation? _____

_____

_____

2.) What is interior display? _____

_____

_____

3.) A. What does ascertained mean? _____

_____

B. What is vapor barrier? _____

_____

_____

4.) A. What is sedation? _____

_____

_____

B. List the clues: _____

_____

_____

D. Illustrations

1.) Gesticulating: _____

_____

_____

2.) Parallels: _____

_____

_____

3.) Brick Corbelling: _____

_____

_____

E. Content Vocabulary (You may list in 2 columns.)

1.) Food Preparation:

2.) Welding:

3.) Business/Management Tactics:

VOCABULARY ASSESSMENT

SUGGESTED - APPROXIMATE ANSWERS

A. Formal Definitions (Answers should be close to these.)

1.) vocation - job for which a person is specially trained.

2.) small-group listening - includes face-to-face listening, listening in a two-person conversation, and listening in a small group.

3.) bearing partitions - those partitions that support the ceiling and/or roof.

B. Synonyms (Answers should be exact.)

1.) (diagnose) - identify

2.) (monosaccharides) - simple sugars

3.) (spall) - chip or crumble

4.) A. longitudinal - lengthwise
B. transverse - crosswise

C. Inferential Clues (Answers will vary but same main point should be included.)

1.) early ambulation - having the patient out of bed and walking a few hours after surgery.

2.) interior display - includes planning for the inside of an entire space, and the decorations, layout and merchandise displays should be coordinated.

3.) A. ascertained - determined or understood
B. vapor barrier - that process which keeps out the moisture

4.) A. sedation - techniques and drugs used by dentists to calm a patient and to relieve pain that are safe and reasonable for patient.
B. Clues:
- to relieve apprehension and fear
- do not render patients unconscious
- protective reflexes remain in tact
- patients will respond to commands
- patient can maintain physiologic functions at reduced levels

D. Illustrations (Answers will vary but main points should be similar.)

1.) gesticulating - gesturing or using the hands and body to communicate ideas to your audience.

2.) parallels - heat-treated steel that is ground into rectangular bars of various sizes, according to need. They are useful during drilling for raising work in the vise.

3.) brick corbelling - bricks which form a shelf or ledge that are arranged in tight rows going across with corners exposed. Two rows of brick border the top and bottom of this arrangement which appears to be a strong construction.

E. Content Vocabulary (Answers may vary slightly.)

1.) Food Preparation:

spices
herbs
flavoring agents
agricultural products
spoilage or decay
enhance the flavor
culinary work
traditional dish

2.) Welding

single-bevel T-joint
square T-joint
plate thicknesses
submerged arc process
fitup
electrode costs

3.) Business/Management Tactics:

lockout
temporary work stoppage
employer, employee
strike
management "locks the gates"
union
negotiate
pressure

ASSESSMENT TWO -- COMPREHENSION

A. Paragraph Subject (2 points each)

Directions: This section will measure your ability to recognize the subject of the paragraph -- what it is about. For each paragraph record its subject in a phrase of approximately 3 - 7 words. Place all answers on the answer sheet.

1.) Many plastics products require thin walls, stiffness and low cost. A blow molded gallon milk bottle requires a minimum of material and is easier to handle when made from a stiff resin like high density polyethylene. On the other hand, flexibility is of value in designing squeeze bottles for hair shampoo or plastic tubing which must be coiled. (Baird, 1976, 77)

2.) The paper stencil method of screen printing is the least expensive and the simplest to prepare. The stencil can be easily cut from paper and attached to the screen. Paper used for making stencils must be tough (but not too fibrous) to prevent tearing and rough edges. If water-base ink will be used for printing, the paper stencil should be made of waterproof paper. (Broekhuizen, 1979, 182)

3.) A party who fails, after a reasonable time has passed, to perform contractual obligations has breached the contract. The breach occurs whether the party has completely or partially failed to perform. In the case of complete failure, the contract is terminated. Partial failure to perform may require the injured party to pay for the work that has already been done. (Rosenberg & Bonnice 1976, 57)

4.) The Code requirements for the installation and construction of recessed fixtures are given in Section 410-64 through 410-72. Of particular importance are the Code restrictions on conductor temperature ratings, fixture clearances from combustible materials, and maximum lamp wattages. Recessed fixtures generate a great deal of heat within the enclosure. Thus, these fixtures are a fire hazard if they are not wired and installed properly. (Mullin, 1981, 70)

B. Paragraph Main Idea (4 points each)

Directions: This series of paragraphs will require you to write a statement of main idea -- including the most important information in the paragraph. Please write in your own words. Record your statements of main idea on the answer sheet.

1.) Many people in the United States get a large part of their calories from sugar, fats, oils, and alcohol. Since these foods are high in calories and have few, if any, nutrients, they are known as empty calories. When people eat too many empty calories, they may not get enough of the nutrients the body needs daily. Eventually, they may develop poor nutrition and health problems. (Kowtaluk, 1977, 63)

2.) After the work has been "roughed down," it must be finish turned to attain the proper size and surface finish required. Generally, only one finish cut is taken since the diameter should be only .030 to .050 oversize after the rough cut. The lathe speed is usually higher than that used for rough turning and a finer feed is used. A sharp toolbit with a slight radius on the point is desirable for finish turning. If the roughing toolbit was used to turn only a few pieces, the cutting edge may still be keen and therefore can be used for the finish cut. (Krar, 1971, 80)

3.) By program implementation, we mean the task of actually converting a problem solution, existing perhaps in the form of a flowchart, into a computer program. This task involves a number of clearly identifiable steps. The first of these is coding; in other words, actually writing the instructions. It's a rare programmer who can write error-free code; thus a second step in this process is program debug, which simply means removing the errors (or bugs) from the program. The final step is program testing. In this step, the program is used to process realistic, representative data, and the results are compared with expected results. These three steps overlap a great deal, with errors frequently being detected during testing and removed (debugged) by recoding portions of the program. (David, 1978, 218)

4.) The seven convenience receptacles are located around the perimeter of the living room. These receptacles are the split-circuit type. That is, the bottom portion of each receptacle is switch-controlled and the top portion of each is hot at all times. These receptacles are controlled by two three-way switches. One switch is located near the front hall and the other is located next to the door leading to the kitchen. (Mullin, 1981, 99)

5.) The uninformed body mechanic will usually seize a rubber mallet or hammer and start the job by striking at the center of the damaged area. While this will force a large area of the sheet metal back into approximately its original position, actually additional damage is being created. In fact this roughing out procedure has not corrected any of the basic damage. That is still there and in most cases some marks of the roughing hammer or mallet plus some stretched metal have been added to the original damage. Extra time, therefore, is required to restore the panel. (Toboldt, 1979, 23)

C. Paragraph Supporting Ideas (3 points each)

Directions: This section will measure your ability to recognize ideas which lend support to or further explain the main idea of a paragraph.

1.) Reread the 5 paragraphs given in the main idea section (item B) and determine at least three supporting ideas for each paragraph. Use your constructed main idea for each paragraph to help you decide on the supporting ideas; be sure that each supporting idea relates to that main idea.

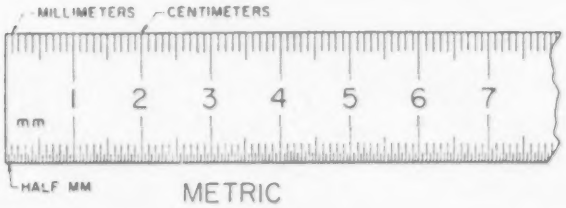
2.) List the supporting ideas in phrases (not a complete sentence) on the answer sheet.

D. Illustrations (3 points each)

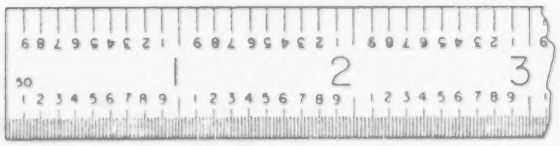
Directions: In this section you will be required to understand the meaning presented in three different types of illustrations. Write a brief explanation for the first two items; describe what you see and and what the illustration is trying to show you, the reader. What is the significance of each illustration? For the third item, label as directed.

1.) Describe the meaning of this illustration. What is it telling you, the reader?

FRACTIONAL INCH



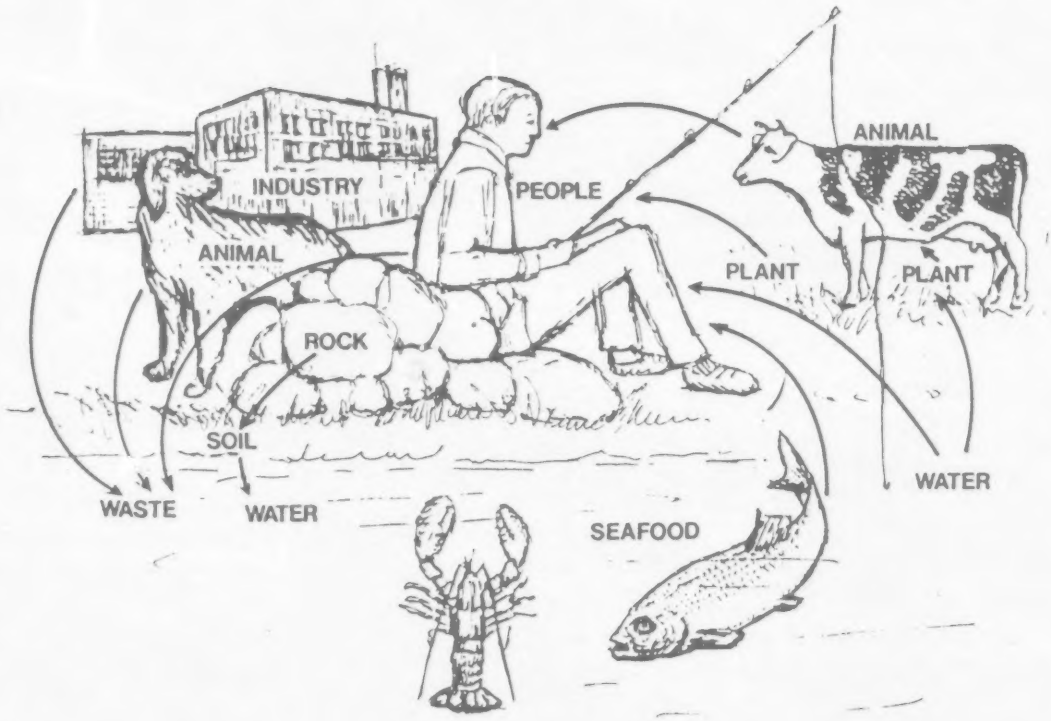
METRIC



DECIMAL INCH

(Walker, 1976, 39)

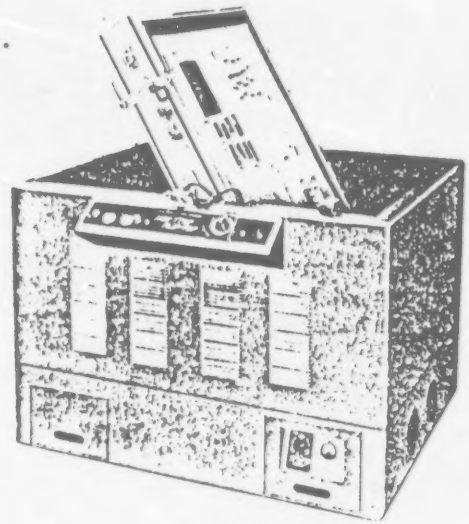
2.) Describe the process in this illustration. What is this cycle showing you?



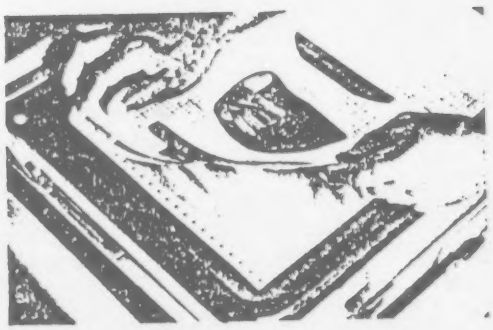
(Kowtaluk, 1977, 32)

3.) The following illustration contains sequential pictures, which represent a process. Look at the pictures and then label accurately the text paragraph which is included on the answer sheet. Place the letter of each picture next to the appropriate sentence or sentences in the text paragraph which describes that picture.

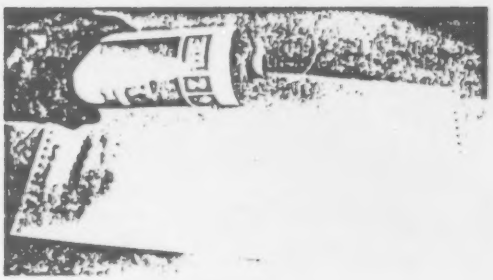
A.



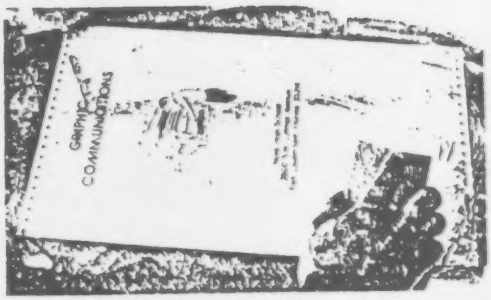
B.



C.



D.



E.

F.

(Broekhuizen, 1979, 252)

* Suggested point evaluations have been given for each section of this assessment. Points assigned to each answer will be determined by overall accuracy of answer. Other point systems may be assigned.

ASSESSMENT TWO -- COMPREHENSION

SAMPLE ANSWER SHEET

Name _____ Date _____

A. Paragraph Subject (Write a phrase)

1.)_____

2.)_____

3.)_____

4.)_____

B. Paragraph Main Idea (Write a sentence)

1.)_____

_____

_____

2.)_____

_____

_____

3.)_____

_____

_____

4.)_____

_____

_____

5.)_____

_____

_____

C. Paragraph Supporting Ideas (Write phrases)

1.)_____

_____

_____

_____

_____

2.)_____

_____

_____

_____

_____

3.)_____

_____

_____

_____

_____

4.)_____

_____

_____

_____

_____

5.)_____

_____

_____

_____

_____

D. Illustrations (Write a brief paragraph or label given paragraph.)

1.)

2.)

3.) After the flat has been prepared, a metal offset plate may be made. The platemaker is used for burning the plate. Open the vacuum frame and clean both sides of the glass to remove any dust or fingerprints. Place the metal plate in the vaccum frame with the presensitized side up.

Place the flat on top of the plate in the vacuum frame with the face up, or in a readable position. Align the gripper margin end of the masking sheet with one end of the plate. Close the vacuum frame, turn on the vacuum pump, and flip frame over so that the flat is now between the plate and the light source. Set the timer and expose the plate for desired length of time.

After exposure, the plate is rubbed up or developed to bring the image into view. Turn off the vacuum and remove the plate, placing it on a flat work surface. Pour a small puddle of process gum in the center of the plate and wipe it over the entire plate surface.

While the process gum is still wet, pour a puddle of developer on the plate. Use a sponge to spread developer over the entire plate surface. For best results, use very light pressure and long, even wiping strokes. The image will begin to appear as the plate is rubbed with the developer. Repeat the rub-up procedure for the second side of the plate. Apply running water to both sides of the plate to remove all traces of the developer. A cotton pad may be used to lightly wipe the plate surface during the rinsing operation.

Allow the plate to dry. Gum arabic is now used to coat the surface of the plate to prevent oxidation of the non-image areas. Gum arabic may be applied with a cotton pad to the entire plate surface.

COMPREHENSION ASSESSMENT

SUGGESTED - APPROXIMATE ANSWERS

A. Paragraph Subject (Answers should be concise -- not too general and not too specific.)

1.) Requirements for plastic products

2.) Paper stencil method of screen products

3.) Breach of contract: definition and consequences

4.) Code Requirements for installing recessed fixtures

B. Paragraph Main Idea (Answers will vary but these main points should be included.)

1.) Many Americans receive a large portion of their calories from "empty-calorie" foods and consequently may not get adequate daily nutrients.

2.) For proper size and surface finish, the roughed down work must be finish turned, generally with only one finish cut, done with a higher lathe speed and finer feed than used for rough turning.

3.) Program implementation, or the process of changing a problem solution into a computer program, includes the definite steps of coding, debugging, and testing which tend to overlap.

4.) The outer walls of the living room contain seven convenience receptacles of the split-circuit type, which are controlled by two three-way switches.

5.) The body mechanic who lacks knowledge about repair may strike the center of a damaged area on an automobile with a hammer and cause more damage and more time for repair.

C. Paragraph Supporting Ideas (Answers will vary but same ideas should be included.)

1.) A. foods high in calories, low in nutrition -- empty calories;
B. sugar, fats, oils, and alcohol -- empty calories foods;
C. people may develop poor nutrition and health problems.

2.) A. one finish cut, diameter should be only .030 to .050 oversize after the rough cut;
B. finish turning, sharp toolbit with a slight radius on the point is desirable for finish turning;
C. if roughing toolbit used to turn only a few pieces, cutting edge may be keen and useable for finish cut.

3.) A. problem solution existing perhaps in form of flowchart;
B. coding, actually writing the instructions;
C. program debug, removing the errors;
D. a rare programmer who can write error-free code;
E. program testing, program used for processing representative data;
F. testing, results are compared with expected results;
G. steps overlap, errors found during testing, then removed by recording.

4.) A. split circuit, bottom portion switch-controlled and top portion hot always;
B. two 3-way switches, one near front hall and other next to door to kitchen.

5.) A. striking center, will force a large area of the sheet metal back into original position;
B. basic damage not corrected;
C. some marks of roughing hammer or mallet may be left;
D. stretched metal may have been added to original damage.

D. Illustrations (Answers will vary; main points should be included.)

1.) This illustration includes a comparison of three rules, each with a different type of measurement. The metric rule is compared to the fractional inch and the decimal inch rules.

2.) Chemical wastes from industry and other wastes from man and animal travel a continuous cycle from water and soil to plants, animals, and people and back into water and soil. Chemicals get into the food chain, either through soil and plants to animals or through the water to fish and animals.

3.) A - Open the vacuum frame . . . to . . . side up.
B - Place the flat on top . . . to . . . end of the plate.
C - Pour a small puddle of process gum . . . to . . . entire plate surface.
D - Use a sponge to spread developer . . . to . . . as the plate is rubbed with the developer.
E - A cotton pad may be used . . . to . . . during the rinising operation.
F - Gum arabic is used to coat . . . to . . . cotton pad to the entire plate surface.

ASSESSMENT THREE -- STUDY/READING SKILLS

To Teachers:

I. This assessment will determine more specific comprehension performance in "study situations." For this, you will use your own selected occupational materials which you will assign to your students for reading.

II. The following procedure is suggested for this informal assessment:

A.) Choose a two-page selection from your occupational text which is close to the beginning of a new chapter.

B.) Have students preview the selection (2-3 minutes). Do not explain guidelines to them; just assign the task.

C.) At the end of preview, ask students to write a preview recitation from memory -- any information they can remember from the preview (3-5 minutes). Encourage them to group ideas together for meaning, as well as recording individual names, words, numbers, etc.

D.) Then, ask students to study-read the selection (7-10 minutes). They can take notes if they choose to do so. Tell them they will be responsible for the understanding of the material.

E.) Have students (without selection and without using notes) answer ten multiple choice or short questions which you will need to devise with your own material (7-10 minutes). [In making the questions, vary difficulty and task, with some factual, others definition, main idea, and drawing conclusions.]

F.) For the last activity, assign students to write a summary of the material read -- without notes or selection (7-10 minutes).

III. Additional Guidelines:

A.) Assign a reasonable time limit for each activity. The preview time is the only one which should be strictly adhered to. Try not to "rush" students, so that they feel frustrated with this assessment.

B.) All writing for this is to be done from memory. Students may use own paper and should label selections carefully.

C.) This informal assessment can be given in a pre and post situation. The procedure should remain constant with the pre and the post measures, and the selections should be similar in difficulty of concept load and readability level. The first measure (pre) should be administered, followed by instruction of and student practice with study/ reading skills (sections 8 & 9 in this manual), and concluded with second measure (post). The criteria for grading both the pre and the post should be parallel.

D.) The assessment can be adminstered one time only, either before instruction to see what needs to be emphasized, or after instruction of study/ reading skills to evaluate student performance in that area.

E.) Points can also be assigned in this assessment. There are three written products to evaluate and a composite score of 25 points can be assigned (5-preview recitation, 10-comprehension questions, 10-summary). Using 25 total points eases the conversion to percentage scores for data recording.

F.) This assessment can be added to, to fit your needs. The tasks involved of reading and writing from memory, previewing summarizing, etc. are important study/reading skills for the vocational student.

SECTION 4
INTRODUCTION TO THE GUIDE

READING THE VOCATIONAL TEXT/SKILLS PRESENTATION

Purpose:

This vocational staff development guide is designed to offer ideas and procedures for integrating reading skills with the occupational content of construction trade careers. To effectively read and understand the materials in this field, students need reading skill instruction and practice. There are two important concepts in teaching reading skills -- the introduction of technique and the opportunity for practice. As teachers, you can help provide this for your students by using the following suggested techniques and practice activities in your classroom.

Organization:

The following sections present important content reading skills and suggested instructional procedures. Only those skills particularly relevant to vocational texts have been included. And, each skill has been divided into segments requiring approximately 5-20 minutes of class time for introduction and for practice. Actually, this will not be additional work for you and your students. Since you will be using the content information to be learned, it will serve as a different method for learning it. Any suggested activities can be utilized as homework with the text assignments you would normally require at that point in your course. Since students must give careful attention to their

text in order to complete the reading skill assignment, they will have the opportunity to "work with" the content material and to learn and understand it better.

Each section introduces a skill and uses a variety of vocational examples to clarify it. Given exercises provide opportunity for the application of the skill and the mastering of it. The explanations and exercises are given to you as vocational teachers, and can be adapted and used with your students. Some changes may be necessary to fit your particular needs.

Following the individual skill discussions is a section called "Suggested Reinforcement Activities/Textbook." Here, each skill can be applied to your course textbook and supplementary reading materials. With this, you will locate skill practice examples within the text for use with your students; these same activities can in turn be assigned to your students for skill practice. This second application accomplishes three purposes:

1) It allows you to locate examples and sample exercises that you can use in your classroom, which will reduce preparation time;
2) It enables you to arrange skill instruction suitable to your text; and
3) It gives you an additional practice opportunity, and with the same materials your students will use.

At the end of each section are additional suggestions for teaching the new skills.

SECTION 5
DEVELOPING VOCABULARY SKILLS

DEVELOPING VOCABULARY SKILLS

To better understand the field of construction occupations the student must know the specialized technical vocabulary. Without understanding of "construction-related" words, the student cannot gain enough information from the reading material. Since complete and rapid comprehension of this content vocabulary is critically important, most textbook authors have purposely provided definitions and other aids (varied type, contextual clues, etc.). Five of these aids are discussed on the following pages: formal definition, synonyms, inferential clues, illustrations, and glossaries.

Contextual Analysis

A practical way to build technical vocabulary is through contextual analysis -- learning the meaning of a word through its use in a sentence. Usually the author will define a technical term the first time it is used. From then on the student must remember it and recognize it as it is used in context. "Clues" within the sentences become important in learning and in remembering the necessary occupational vocabulary; they are the bits of information which help you arrive at the meaning. The following discussion of contextual analysis includes formal definition, synonyms and inferential clues.

A. Formal Definitions

Often an author will define an important technical term in the sentence that introduces it.

Example: Properties of Brick
The term generally used to indicate burned clay units that are used primarily in building construction is STRUCTURAL CLAY PRODUCTS. (Kicklighter, 1980, p. 11)

Term	Definition
structural clay products	burned clay units

Clue words tell the reader that a definition is included in the sentence. The clue words in this example are "the term." Other clue words which the author might use are: is, means, are, is referred to, is called, and is defined as.

Exercise A: Practice this vocabulary skill by locating the technical term and its definition in each of the following items. Remember that a technical term is a word specific to the occupation and it may include one word or several.

1. A bill of materials is a table of information that tells the requirements for a given project (Feirer & Hutchings, 1976, p. 58).

Term	Definition
_____	_____
	_____

2. The combined slab and foundation, sometimes referred to as the thickened-edge slab, is useful in warm climates where frost penetration is not a problem (Anderson & Winslow, 1976, p. 15).

Term	Definition
_____	_____
	_____

3. Since the goal at this stage of construction is to enclose the structure and make the roof watertight, only those partitions that support the ceiling and/or roof (bearing partitions) are usually installed (Wagner, 1979, p. 142).

Term	Definition
_____	_____
	_____

B. Synonyms

As an alternative to a formal definition, construction-related occupational literature may clarify a technical term in the context by the use of a synonym. A synonym is a word or words which are similar in meaning to another word. The synonym may be enclosed in commas or parentheses directly following the term, or separated from the term by the word "or."

Example: Two types of concrete floor construction are the combined (or unified) slab and foundation and the independent slab and foundation (Feirer & Hutchings, 1978, 274).

Term	Synonym
combined	unified

Exercise B: Locate the term and the synonym in each of the given paragraphs.

1. Mortar joint finishes are of two types: trowled and tooled joints. In the troweled joint, the excess mortar is struck (cut off) with a trowel and finished with the same tool (Kicklighter, 1980, p. 2).

Term	Synonym
_____	_____

2. The members used to span over window and door openings are called headers or lintels (Anderson & Winslow, 1976, p. 34).

Term	Synonym
_____	_____

3. An access hole (also called a scuttle hole) must be included in the ceiling frame to provide an entrance to the attic area (Wagner, 1979, p. 153).

Term	Synonym
_____	_____

4. Architectural terra cotta is a custom (made to order) product. It is produced in sizes and shapes to meet specific requirements. An unlimited color range of high-fired, ceramic vitreous (glass-like) glazes is available. The configarations, (arrangement of parts) forms and radius shapes in which architectural terra cotta can be made are almost unlimited. It is not affected by weather (Kicklighter, 1980, p. 27).

	Term	Synonym
a.	_____	_____
b.	_____	_____
c.	_____	_____

C. Inferential Clues

Sometimes an author makes the meaning of a word clear, but doesn't actually define it. Also, as mentioned before, a technical term may be defined once early in the book, and then used later without definition. In both cases, the reader must use all the clues in the surrounding sentences (the context) to determine meaning. Students reading the following excerpt might not know the word "caustic." However, looking carefully at the contextual clues will help them to arrive at meaning. In this excerpt the useful clues are underlined; students finding these aids could determine the meaning of "caustic" as "dangerous and harmful."

Example: Crop driers are fire hazards if they are improperly installed or operated. They should be installed in accordance with NFPA Code on Crop Driers. When existing storage is used for drying crops, the drier should be connected to the crib or bin by a noncombustible duct at least 10 feet long. Permanent, fire-resistant, complete drying units should be located at the distance from other buildings that is specified by insurance companies involved.

Many farms are equipped with feed grinding and processing plants. These plants become very dusty, and are subject to the same hazards as grain elevators and feed mills. This hazardous dusty situation requires the installation of dusttight wiring and equipment and totally enclosed motors to prevent spark from being exposed to fine dusty materials. Fine dust is a highly combustible material that will explode and burn with the same aspects as volatile fuels (U.S. Dept. of Agriculture, 1967, p. 18).

Exercise C: Read the following two selections and then briefly list the clues which would help the reader analyze the meaning or partial meaning of the term given.

1. Before repainting, the probable cause of the trouble should be ascertained. If it is due to springtime blistering on localized areas on the house in the colder northern states, a more effective vapor barrier is needed. This can be obtained by painting the indoor side of the exterior walls. Two coats of aluminum paint plus two coats of decorative paint are best for sand-finish plaster. On smooth plaster, a prime-sealer and at least one coat of semigloss paint make a good barrier. Shutting off humidifiers will also help (U.S. Dept. of Agriculture, 1973, 13).

   a. Term: vapor

   b. Clues which could help reader arrive at meaning:

   c. Inferred definition

2. When an exposed foundation is used as a finished wall for basement rooms, the stack bond pattern may be employed for a pleasing effect. This consists of placing blocks one above the other, resulting in continuous vertical mortar joints. However, when this system is used, it is necessary to incorporate some type of joint reinforcing every second course. This usually consists of small diameter steel longitudinal and cross rods arranged in a grid pattern. The common bond does not normally require this reinforcing, but when additional strength is desired, it is good practice to incorporate this bonding system into the wall (Anderson & Winslow, 1976, p. 10).

   a. Term: longitudinal

   b. Clues which could help reader arrive at meaning:

   c. Inferred definition

Illustrations

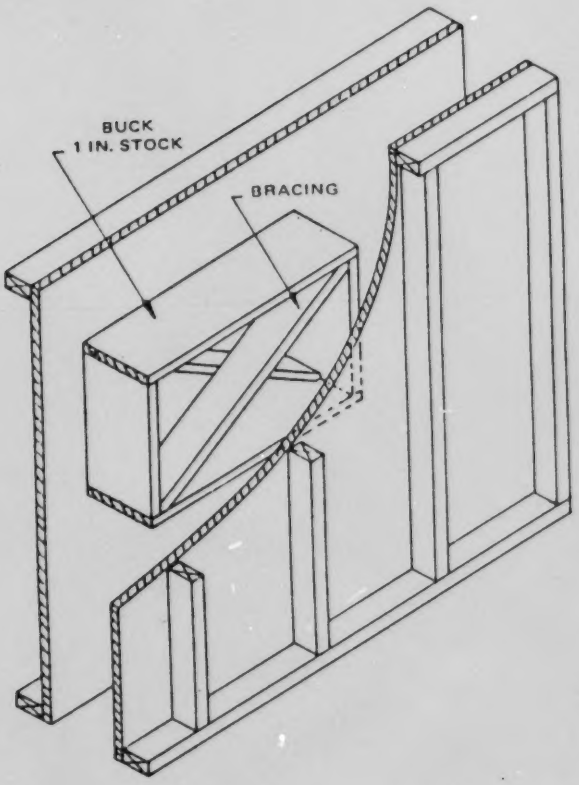
A common type of definition in an occupational text is the illustration. Unfortunately, students often skip over the illustrations when they are reading -- assuming the printed words are more important. An initial task for the instructor is to emphasize to the students the need for immediate study of designated figure whenever it is mentioned in the content

of the text (Example: See Figure 8-2). The illustration will help them to visually understand the technical term to be learned. With repeated practice students will later apply the visual definition automatically to the term in context.

Example: Notice the way in which this illustration defines the term that is explained in the text.

Figure 10: Illustration

Any openings in the wall, such as for windows, can be formed using BUCKS. Bucks are wood or steel frames set in the form between the inner and outer form to make an opening in the wall (Kicklighter, 1980, p. 170).



Pg.# terms	Pg.# Ill.	Terms
170	170	Buck

Exercise D: Identify the illustrations and terms in Figure D-1, then in the two remaining illustrations (Figure D-2 and D-3).

Ill. #	terms

(From Figure D-2)

Ill. #	terms

(From Figure D-3)

Ill. #	terms

Figure D-1: Flush Ceiling Framing

In many house designs, the living room and the dining or family room form an open "L." A wide, continuous ceiling area between the two rooms is often desirable. This can be created with a flush beam, which replaces the load-bearing partitions used in the remainder of the house. A nail-laminated beam, designed to carry the ceiling load, supports the ends of the joists. Joists are toenailed into the beam and supported by metal joist hangers (fig. 41,A) or wood hangers (fig. 41,B). To resist the thrust of the rafters for longer spans, it is often desirable to provide added resistance by using metal strapping. Strapping should be nailed to each opposite joist with three or four eightpenny nails. (Anderson & Winslow, 1976, 42)

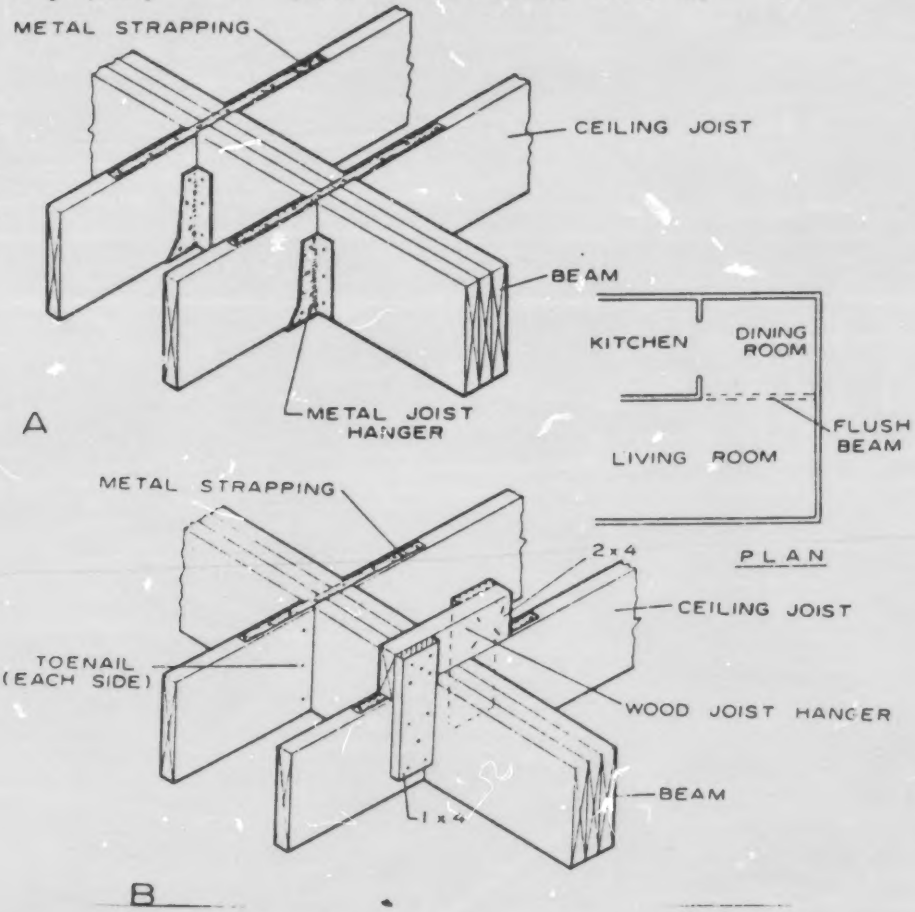


Figure D-2: Coursing

In general, the conventional course (straight row) design is preferable to the staggered (or brick)design: (Montgomery Ward, 6)

Illustration 2 Illustration 3

Figure D-3: Adhesives

There are numerous panel adhesives available. Most are packed in cartridges for application with a caulking gun, figure 11-10. Because of the number of available adhesives, it is advisable to follow the specific manufacturer's instructions. (Ball, 1975, 95)

Fig. D-3 Caulking Gun

Glossaries

Many current vocational texts include glossaries (listings of important vocabulary) at the end of the chapter or at the conclusion of the book. The instructor's task is to stress the need for the student to use this vocabulary aid. During much of the course, students should be required to review the glossary before beginning a new chapter. Students would either review the one at the end of the new chapter or those words indicated by the teacher in the glossary in the back of the book. As students read the chapter and encounter a new word that is defined in the glossary, they can note it on notepaper, along with the definition. This can be included with the notes on that particular chapter -- either within the class notes or on a separate piece of paper.

Exercise E: Suggested Reinforcement Activities/Textbook

Select an introductory chapter from the vocational text you use in your teaching. Look for the vocabulary aids just introduced and discussed.

This will help you to better understand the skill and its major parts and will show you examples to use when teaching this skill. These same activities can be assigned to your students for practice and reinforcement of the vocabulary skills.

I. Contextual Analysis

A. Formal Definitions

	Pg.#	Term	Clue Word	Definition
1.				
2.				
3.				
4.				
5.				

B. Synonyms

	Pg.#	Term	Synonym
1.			
2.			
3.			
4.			
5.			

C. Inferential Clues

	Pg.#	Term	Definition	Clues (Words, Phrases)
1.				
2.				
3.				
4.				
5.				

II. Illustrations

	Ill.#	Terms defined by illustration
1.		
2.		
3.		
4.		
5.		

III. Glossary

	Pg.#	Terms found in glossary for this chapter
1.		
2.		
3.		
4.		
5.		

Procedures: Teaching Students Improved Vocabulary Skills

Vocabulary skills should be introduced and practiced throughout the course. Instruction of new techniques and discussion of examples will require only 15-20 minutes. Giving students the chance to recontact the word is very important since this is what helps the new occupational term to remain in a student's vocabulary. A new word is easily forgotten if it is not "seen again." These terms should be recontacted over a period of time. Suggested activities for recontact are:

1) Teacher reviewing students orally in class.
2) Students reviewing each other orally.

3) Teacher assigning students to write a paragraph using five of the technical terms recently or previously learned.

4) Students making flash cards for quick review, with word on the front and definition on the back.

5) Teacher using a CLOZE paragraph where students must fill in appropriate occupational terms.

Additionally, students should be encouraged to keep a collective list of content vocabulary with definitions and page location in text per chapter. With this, students can recognize words to be learned and see the relationship the words have to each other in that particular chapter. They will have a definite guideline for words to be learned. This activity can be classwork, be assigned as homework, and be evaluated for credit.

In selecting paragraphs and specific examples to teach the vocabulary skills, begin simple and increase to the longer and the more difficult. Students first need to gain confidence in the particular vocabulary skill. This can be done with both the textbook materials and the manufacturers' materials.

The instruction of vocabulary skills would be spread throughout the course. Introduce each vocabulary technique and give opportunity for practice. Emphasize the "occupational" terms since the learning of them is vitally important to the understanding of the written material whether text or manufacturers'.

SECTION 6
DEVELOPING COMPREHENSION SKILLS: THE PARAGRAPH

DEVELOPING COMPREHENSION SKILLS/THE PARAGRAPH

Understanding paragraph organization is an important reading skill for the vocational student. A paragraph has three major components:

1) the subject (what is being talked about)

2) the main idea (the most important information about the subject

3) the supportive information (details that make the information clearer)

Of these, the main idea is the most crucial, for the key points of a chapter or article are simply selected main ideas from component paragraphs.

Look at the following paragraph. Search for the subject, the main idea, and the supporting details.

> Redwood is an excellent insulator against heat and cold. And, because the heartwood contains no volatile resins, it is highly rated for its resistance to fire and flame spread. In fact, this property allows it to be used in construction of heat resistant safes and fire walls between commercial and industrial buildings. (California Redwood Association, 1968, 1)

At first it appears that the subject of this paragraph is "redwood as insulation." However, closer inspection shows that that is only one specific example of how redwood responds to heat and cold. The subject is actually "redwood and temperature" while the main idea, the most important information about this subject, is "redwood is highly resistant to heat and cold." The other specifics about insulation, resin, and construction uses simply provide supportive information.

Paragraph Subject

The key to finding the subject of a paragraph is finding the one topic that everything else in the paragraph is related to. A paragraph usually discusses only one small aspect of a larger topic, therefore, the subject must not be too general. It must identify the specific topic being discussed. At the same time, it must not be too specific, substituting an example of the subject being discussed for the subject itself.

Exercise A:

Read the following two paragraphs on oak floors (National Oak Flooring Manufacturers Association, 1971, 3, 4). In each case many specifics about oak flooring are given, each of which could easily, and incorrectly, be chosen as the subject. Students could also read the selections uncritically and choose "oak floors" as the subject, which is much too general. Instead, the subject must be inferred from the supportive information given.

> Oak flooring, despite its long history, is a truly modern product and is available in a wide variety of styles, grades, sizes and finishes. The basic types of oak flooring are strip, plank, unit block and parquet. Its cost depends on the type selected, grade, whether it is plain or quartersawed, and whether or not it is pre-finished at the factory.
> Subject _____

> During its lifetime, oak is almost completely immune to signs of age, sunlight and temperature. Oak flooring does not harden when cold, nor soften when warm. Because it is scientifically kiln-dried, it adapts itself to the air's moisture content, reducing the possibility of expansion or shrinkage to a minimum.
> Subject _____

Paragraph Main Idea

The main idea of a paragraph includes the most important information of that paragraph. The following four guidelines can help in its location:

1. If the paragraph includes the definition of a term, that term might be part of the subject. The definition might be part of the main idea.
2. If there are examples, these may illustrate all or part of the main idea.
3. If a key word or phrase is repeated, it might be part of the subject or main idea.
4. Highlighted words might be part of the subject or main idea.

Note that the word "might" is used in each instance. These guidelines can point toward possible main ideas, but they cannot automatically select the right one.

The main idea is not necessarily the topic sentence. It is a statement which includes all the most important ideas of the paragraph, and they may be contained throughout the paragraph. Looking effectively for this "framework" requires much practice. Therefore, writing a statement of main idea is helpful, and recommended for teaching this skill of main idea. The following procedure should be used when making a statement of main idea:

1. Look for the most important ideas in the paragraph.
2. Write them in a statement in your own words.
3. Be brief and concise.

Exercise B:

Look at the following four paragraphs. First ask yourself what the paragraph is about (the subject). Then look for the main idea using the suggested guidelines. Note which guidelines are most helpful in each case. Finally, make a statement of main idea with aid of the suggested procedure. (It may be helpful to underline words and phrases which pertain to the important information.)

> Redwood is far more durable than any finish yet developed, and a finish need not be used to protect it. You can leave a fence unfinished, to weather-bleach ultimately to a driftwood gray; you can apply annual coats of water repellent to help stabilize the color at a buckskin tan; you can bleach the wood for a quicker driftwood gray effect than natural weathering can accomplish; you can stain the fence with either a lightbodied, penetrating stain (does not obscure the grain of the wood, but presents a uniform appearance) or a heavy-bodied stain (obscure the grain but not the texture). Do not use varnishes or other clear, film-forming finishes on exterior wood. Such a finish deteriorates quickly, and refinishing is difficult and expensive. (California Redwood Association, 1973, 21)

A. Subject: _____

B. Statement of Main Idea: (Either write here or underline)

_____

_____

> Gutters, or eaves troughs, are used to collect and divert water away from eaves lines and foundation systems. Gutters are usually made of metal or plastic and are available in a wide variety of styles and sizes. At one time, molded wood gutters were fre-

quently used, but for economic reasons the metal gutter has now replaced the wooden gutter in popularity. (Ball, 1975, 36)

A. Subject: _____

B. Statement of Main Idea: _____

_____

_____

Open stairs permit rapid spread of heat, smoke, and fire because they act as chimneys for hot, gas-laden air to rush from the lower to the upper floors. They are especially dangerous in spreading fire if their base is in a hall or room having wide, doorless openings into other rooms. Open stairways and wide, doorless openings between the stair hall and other rooms are often desirable to make an attractive arrangement of rooms. For fire protection, however, it is desirable to have openings leading from the stair hall provided with doors. A closed hall may also help to conserve heat in winter. (U.S. Dept. of Agriculture, 1967, 7)

A. Subject: _____

B. Statement of Main Idea: _____

_____

_____

A dormer is a framed structure projecting above a sloping roof surface, and normally contains a vertical window unit. Although its chief purpose is to provide light, ventilation and additional interior space, it should also enhance the exterior appearance of the structure. (Wagner, 1979, 175)

A. Subject: _____

B. Statement of Main Idea: _____

_____

_____

Paragraph Supportive Information

Authors use supporting ideas to carry out their main ideas. They may present these supporting ideas in several ways: giving particular cases, using a restatement, giving reasons, and making comparisons and contrasts (Blake, 1973, 23). Supportive information helps us to understand the meaning of the main idea, since it provides explanation. Each supporting idea must refer to that main idea.

Author's clues help us to locate supporting ideas. Examples of these clues are: "for example," "for instance," "that is," "in other words," "for these reasons," and "consequently."

Exercise C:

Turn back to the paragraphs in Exercise B in which you were to make statements of main idea. Use the main idea of each to help you locate supporting ideas. Remember that each supporting idea must relate to that main idea. (This can help you to determine the accuracy of your main idea.) For each of the four paragraphs record the main idea and the supporting ideas below.

1) Main Idea: _____

_____

Supporting Ideas:

1.

2.

3.

2) Main Idea: _____

_____

Supporting Ideas:

1.

2.

3.

3) Main Idea: _____

_____

Supporting Ideas:

1.

2.

3.

4) Main Idea: _____

_____

Supporting Ideas:

1.

2.

3.

Paragraph Comprehension and Illustrations

Paragraph comprehension can be reinforced by the proper use of illustrative material. In construction-related literature processes are often illustrated by sequential diagrams. Students must learn to "read" the diagram in its proper sequence and to relate each phase to the appropriate portion of the prose (text material).

At other times non-sequential illustrations are used to highlight the important concepts (usually the main idea) presented in the prose that do not describe a process.

A. Sequential Illustrations

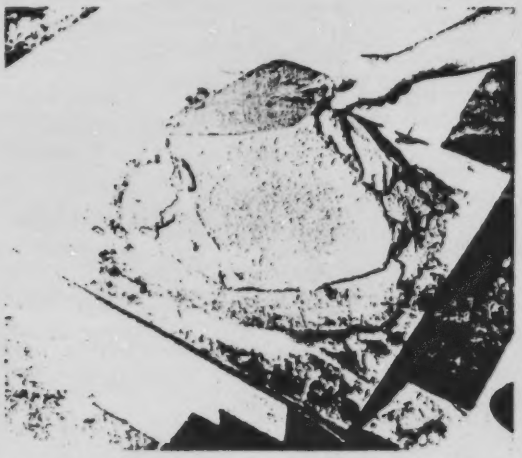
Figures 11 and 12 utilize step-by-step illustrations to clarify the text material. Selections such as these can be duplicated for student practice; students can integrate the text and the illustration by drawing lines from the words in the material to the corresponding phase of the diagram.

Figure 11: Illustrations
LOADING THE TROWEL

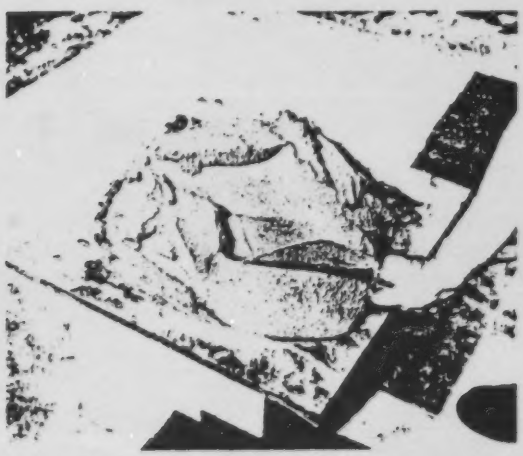
Mortar may be loaded on the trowel in several ways:
1. From the side of the board.
2. From the middle.
3. From the top of the pile.

Fig. 8-2 shows the steps used by one mason to load the trowel. Develop the method which works best for you and perfect it.

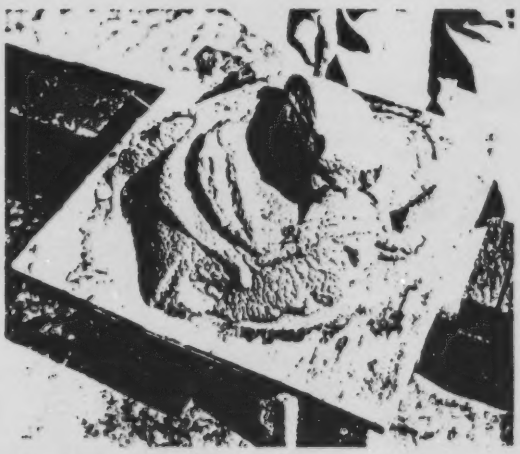
STEP 1: WORK THE MORTAR INTO A PILE IN THE CENTER OF THE MORTAR BOARD.



STEP 2: SMOOTH OFF A PLACE WITH A BACKHAND STROKE.



STEP 3: CUT A SMALL AMOUNT FROM THE LARGER PILE WITH A PULLING ACTION.



STEP 4: SCOOP UP THE SMALL PILE WITH A QUICK MOVEMENT OF THE TROWEL.

Fig. 8-2. Steps in loading trowel.

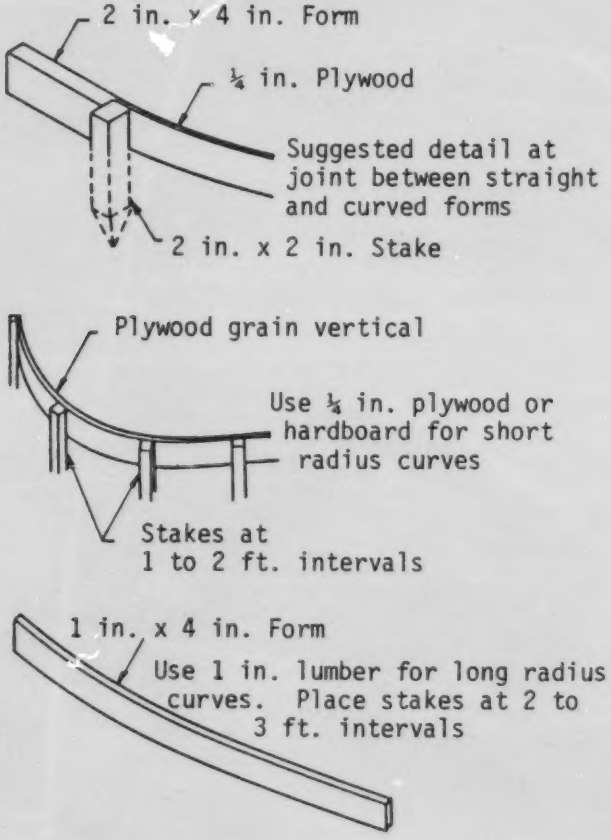
(Kicklighter, 1980, p. 105)

Figure 12: Illustration

Forming Curves

Horizontal curves are easy to form if plywood, 1 in. boards, hardboard or sheet metal is used. Curves with a short radius may be formed with ¼ or ½ in. plywood with the face grain vertical. If heavier lumber is desired or a sharper bend is necessary, saw kerfing will help. Wet lumber will bend easier than dry. Fig. 10-26 shows some details for forming horizontal curves.

Long gentle curves may be formed using 2 in. thick material. Staking must be very secure because it must support a heavier load. It is a good idea to use extra stakes for all types of curves.


2 in. x 4 in. Form
¼ in. Plywood
Suggested detail at joint between straight and curved forms
2 in. x 2 in. Stake
Plywood grain vertical
Use ¼ in. plywood or hardboard for short radius curves
Stakes at 1 to 2 ft. intervals
1 in. x 4 in. Form
Use 1 in. lumber for long radius curves. Place stakes at 2 to 3 ft. intervals

Use saw kerfing to bend 2 in. lumber cut kerf 1/2 to 2/3 the thickness. Bend so that kerfs close

(Kicklighter, 1980, p. 171)

B. Non-sequential Illustrations

Figure 13 uses illustrations that are not sequential to clarify text material. In this case, a process is not described. Again, students should relate each part of the diagram with the appropriate phrases in the paragraph by drawing connecting lines.

Figure 13: Illustration

Obtain a long piece of wood -- such as a yardstick -- and mark off 4¼" segments ... representing tile size. If you have tile samples, you could lay the samples beside the wood and mark the segments in accordance with the tile itself.

Now locate the lowest place in the floor of the wall you plan to measure. Place the layout stick at this point and measure up to the exact height of the tile placement. this will show you exactly how many rows of tiles you will need for that wall. (Montgomery Ward, 1974, 2)

Exercise D: Suggested Reinforcement Activities/Textbook

1) Select 4 paragraphs of average length, each from a different chapter of your textbook. Identify the subject in each.

	Page #	Column #	Paragraph #	Subject of Paragraph
1.				
2.				
3.				
4.				

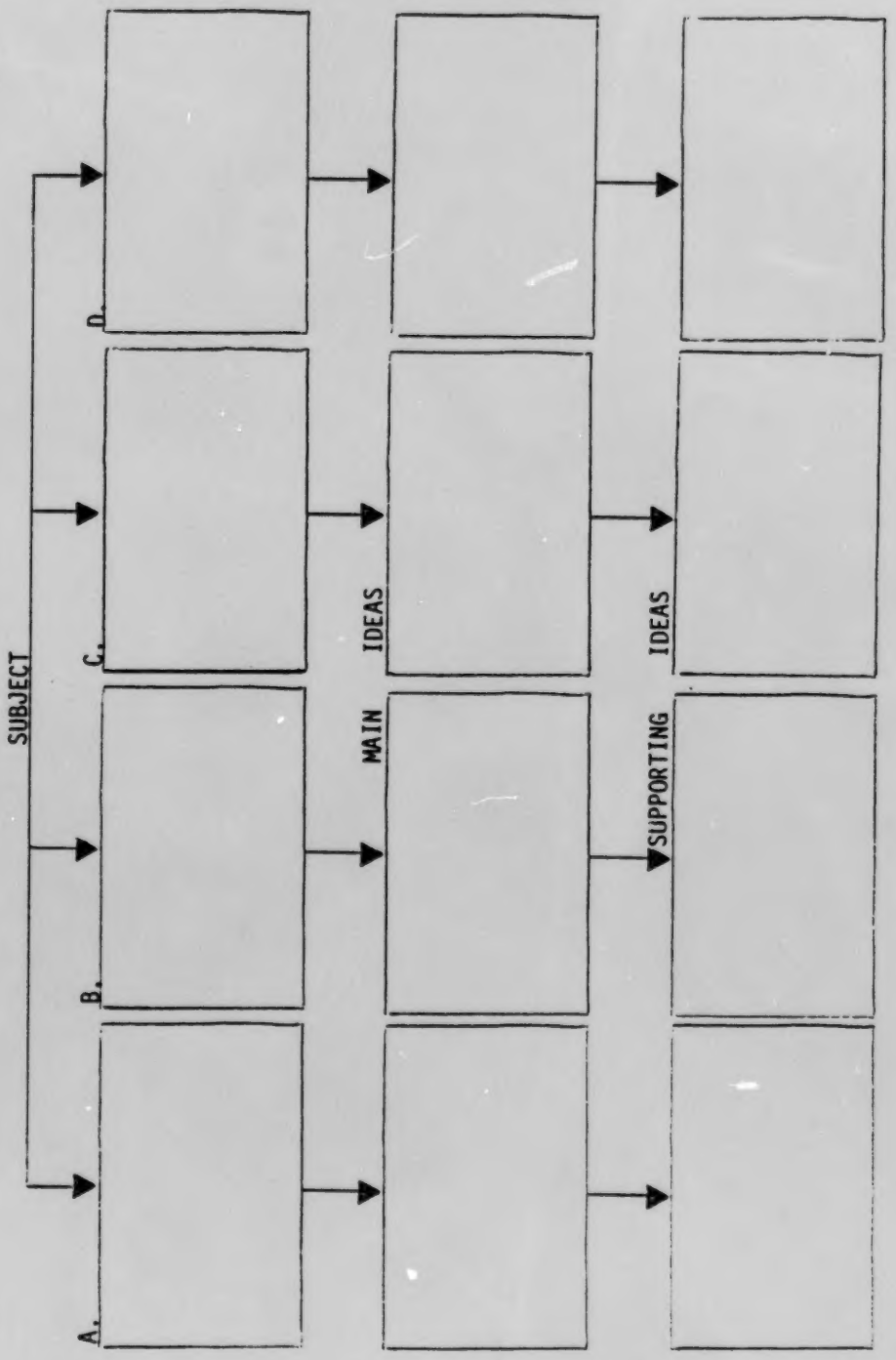
2) Select four paragraphs from your textbook, each from a different chapter. Identify the subject, and write a statement of main idea for each.

	Page #	Column #	Paragraph #	Subject	Statement of Main Idea
1.					
2.					
3.					
4.					

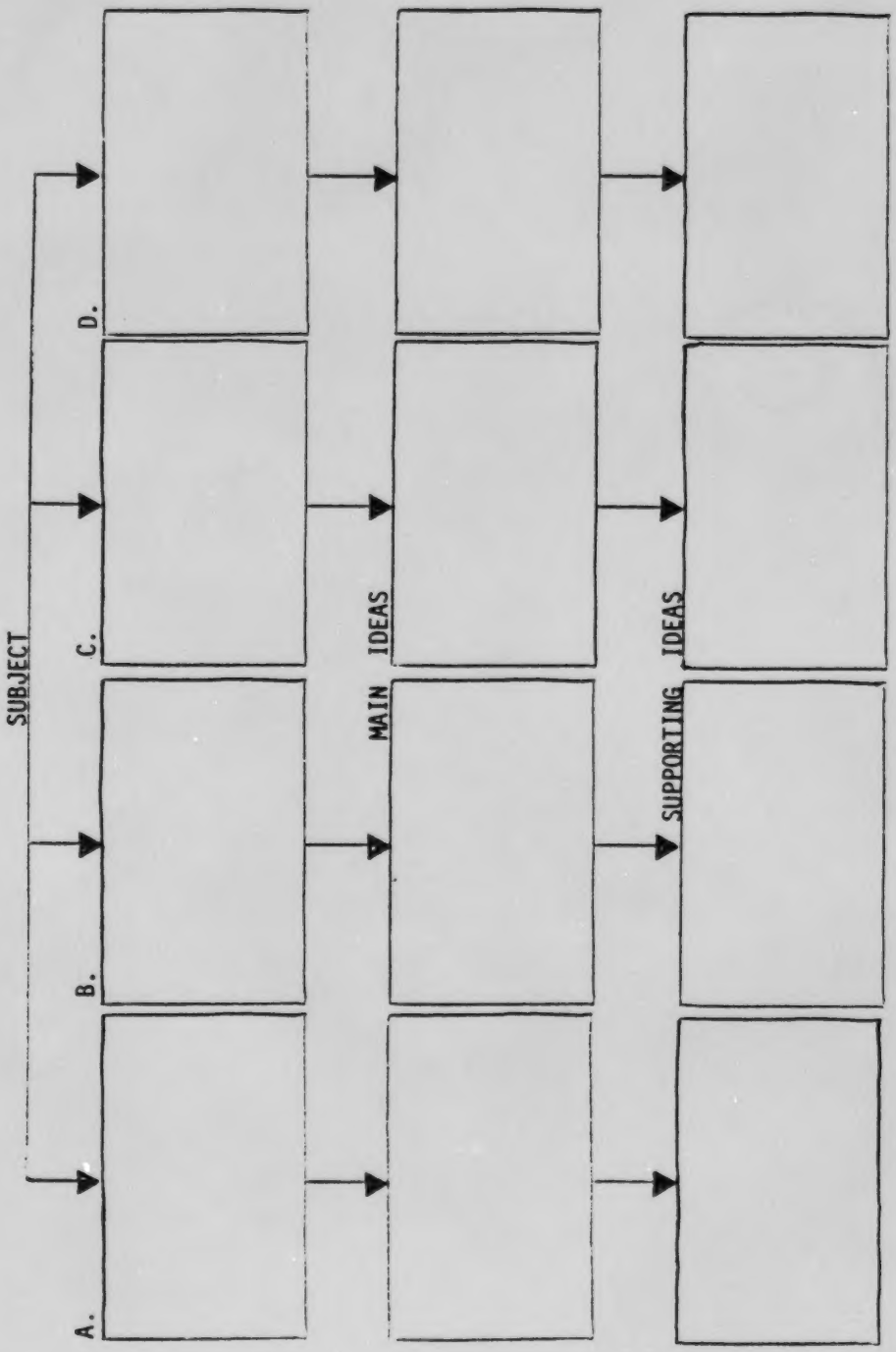
3) Next, choose four sequential paragraphs of a text chapter, Identify the subject and write a statement of main idea for each.

	Page #	Column #	Paragraph #	Subject	Statement of Main Idea
1.					
2.					
3.					
4.					
5.					

4) Take the same paragraphs selected for item #2 and find supporting ideas. Complete the following chart



5) Use the same paragraphs selected for item #3 and find supporting ideas. Complete the following chart.



6) Select four sequential and/or non-sequential diagrams that illustrate the main idea of a paragraph within the text material.

	Illustration Page #	Prose Page #	Subject
1.			
2.			
3.			
4.			

Procedures: Teaching Students to Better Understand the Paragraph

Understanding the paragraph is one of the most important and one of the most difficult reading skills the vocational instructor must teach. It is the basis of understanding what is read; it is definitely needed knowledge for the higher-level comprehension skills, which are necessary for construction-related literature.

Recognizing the framework of the paragraph (the subject, the main idea, the supporting ideas) requires the ability to distinguish. Students need careful guidance in identifying the subject, and distinguishing among main idea information, supporting ideas, and material that is totally unimportant. It is necessary to introduce the material slowly and incrimentally, as was done here. Students need to be aware of the importance of their understanding the paragraph, so that they can exert maximum effort to this reading skill.

In your instruction, move slowly through the information. Three or more class sessions should be given to the introduction of each of the paragraph components, with assigned practice for outside of class. When the students show competence with the first component (the subject), move to main idea and introduce this gradually, presenting and practicing each of the four clues. With main idea, emphasize the concept of "what is the most important information the author is giving you in this paragraph." Discuss how to make a statement of main idea by using the suggested guidelines. The practice of writing the main idea will help to clarify this skill and make it a usual reading behavior.

Then progress to the supporting ideas, discussing the different types and emphasizing the function of this component. Students should clearly understand that supporting ideas must relate to the main idea, and that they help to explain.

Practice with integrating text material and illustrations will be equally useful to your students. Construction-related literature contains many illustrations and diagrams which help to explain the main points expressed in the prose. The visual reinforcement can be most beneficial.

Important Considerations:

A. Introduce paragraph components gradually over a period of time.

B. These skills need to be practiced frequently so the students can acquire competence with them.

C. In using text extractions for examples and assigned practice, begin short and build to longer selections. Also, begin easy and increase to more difficult material.

D. The paragraph you identified in "Suggested Reinforcement Activities" can be assigned for location of subject, main idea, and supporting ideas.

E. The activities in "Suggested Reinforcement Activities" are effective practice for the paragraph skills and can be assigned to your students as well.

SECTION 7

DEVELOPING COMPREHENSION SKILLS: RECOGNIZING AND RECORDING COMPLEX INFORMATION

DEVELOPING COMPREHENSION SKILLS/ RECOGNIZING AND RECORDING COMPLEX INFORMATION

In construction-related literature there are large amounts of new information to be learned. Within this information there are logical relationships--classification, comparison and causality. Recognizing these relationships and learning how to record them effeciently for study can be beneficial to the understanding of the material.

The nature of these relationships should be established. Classification in its simplest form is listing. Comparison is the process of finding likenesses and differences. Causality, or cause-effect, is that which results from something else. These will be further discussed, with accompanying examples.

Classification

Classification is a listing of information. The use of classification can be signaled by the following: a colon (:); numbers or letters; words such as "these include." At other times it is simply introduced by a statement: "there are three kinds of joints."

Information which includes classification can be recorded by simple listing if single items are given, or by outlining when items are more complex and require explanation.

Example:

ELEMENTS OF DRAWING

A drawing consists of lines, dimensions, symbols, and notes. Lines show the shape of a product and include many details of construction. Fig. 3-8. Dimensions are numbers that tell the sizes of each part as well as overall sizes. The craftsman must follow these dimensions in making the materials list and the layout. Symbols are used to represent things that would be impractical to show by drawing, such as doors, windows, electrical circuits, and plumbing and heating equipment. Fig. 3-9. Some drawings also contain notes or written information to explain something not otherwise shown. Frequently in these notes abbreviations are given for common words (Feirer & Hutchings, 1976, 36).

Elements of a Drawing

A. Lines (shape and construction details)

B. Dimensions (sizes)

C. Symbols (represent complex things)

1. windows, doors, plumbing, etc.

D. Notes (written information and abbreviations)

More complicated classification can be presented with the use of a more detailed outline,

I. _____

A. _____

1. _____

a. _____

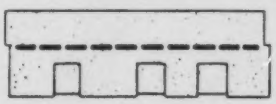
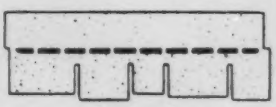
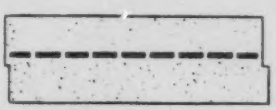
2. _____

a. _____

B. _____

Modified outline charts can also be constructed for the classification of complex information. Some students prefer the "visual grouping" of the charting procedure, as compared to the written outline. Notice the following example in Figure 14.

Figure 14: Modified Outline Chart

PRODUCT	Configuration	Per Square			Size		Exposure	Underwriters' Listing
		Approximate Shipping Weight	Shingles	Bundles	Width	Length		
Wood Appearance Strip Shingle More Than One Thickness Per Strip  Laminated or Job Applied	Various Edge, Surface Texture & Application Treatments	285# to 390#	67 to 90	4 or 5	11-1/2" to 15"	36" or 40"	4" to 6"	A or C - Many Wind Resistant
Wood Appearance Strip Shingle Single Thickness Per Strip 	Various Edge, Surface Texture & Application Treatments	Various 250# to 350#	78 to 90	3 or 4	12" or 12-1/4"	36" or 40"	4" to 5-1/8"	A or C - Many Wind Resistant
Self-Sealing Strip Shingle	Conventional 3 Tab	205#-240#	78 or 80	3	12" or 12-1/4"	36"	5" or 5-1/8"	A or C - All Wind Resistant
	2 or 4 Tab	Various 215# to 325#	78 or 80	3 or 4	12" or 12-1/4"	36"	5" or 5-1/8"	
Self-Sealing Strip Shingle  No Cut Out	Various Edge and Texture Treatments	Various 215# to 290#	78 to 81	3 or 4	12" or 12-1/4"	36" or 36-1/4"	5"	A or C - All Wind Resistant
Individual Lock Down Basic Design	Several Design Variations	180# to 250#	72 to 120	3 or 4	18" to 22-1/4"	20" to 22-1/2"	-	C - Many Wind Resistant

(Wagner, 1979, 188)

Exercise A:

Classify the following information on a separate piece of paper. Construct an outline or an outline chart to record the material which discusses insulating board.

STRUCTURAL INSULATING BOARD

Most structural insulating board is made from wood fibers. It comes in two grades - sheathing and insulation.

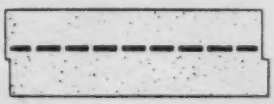
There are two types of sheathing-grade insulation board. In one type all the surfaces and edges are covered with asphalt. In the other type the fibers are impregnated with asphalt during manufacture. These boards usually come in 4' x 8' sheets, 25/32" thick. They also come in 2' x 8' sheets. Sheathing grade is used for insulation and sound control as well as for structural sheathing.

Insulation grade is made in decorative panels, decorative ceiling tile, V-notched plaster base, and roof insulation. The standard thicknesses of this type of board are 1/2", 5/8", 3/4", or 1", although thicker boards up to 2" to 3" for roof insulation are also made. Sometimes thicker board is made by using an insulating board in the middle and a 1/4" hardboard on both surfaces. Ceiling tiles are made in a wide variety of sizes with tongue-and-groove edges, and with a choice of finishes. They are also made with a series of small holes to improve the sound control. Ceiling tile can be cemented, clipped, stapled, nailed, or interlocked in place. Acoustical tile absorbs up to seventy percent of the noise in a room.

Comparison

While classification is commonly used in construction-related literature, it is seldom used alone. Once elements of a topic have been classified into sub-topics, these sub-topics are usually compared. The textbook often provides comparison charts in which the topics to be compared are given along one axis and the features of comparison are given along the other. If a comparison chart does not accompany the text information, then a student can construct his own. It is important that the student understands the organization of this type of chart before he constructs his own. Use a chart such as the following as a model for review by students.

Figure 15: Comparison Chart

PRODUCT	Configuration	Per Square			Size		Exposure	Underwriters' Listing
		Approximate Shipping Weight	Shingles	Bundles	Width	Length		
Wood Appearance Strip Shingle More Than One Thickness Per Strip Laminated or Job Applied	Various Edge, Surface Texture & Application Treatments	285# to 390#	67 to 90	4 or 5	11-1/2" to 15"	36" or 40"	4" to 6"	A or C - Many Wind Resistant
Wood Appearance Strip Shingle Single Thickness Per Strip	Various Edge, Surface Texture & Application Treatments	Various 250# to 350#	78 to 90	3 or 4	12" or 12-1/4"	36" or 40"	4" to 5-1/8"	A or C - Many Wind Resistant
Self-Sealing Strip Shingle	Conventional 3 Tab	205#-240#	78 or 80	3	12" or 12-1/4"	36"	5" or 5-1/8"	A or C - All Wind Resistant
	2 or 4 Tab	Various 215# to 325#	78 or 80	3 or 4	12" or 12-1/4"	36"	5" or 5-1/8"	
Self-Sealing Strip Shingle  No Cut Out	Various Edge and Texture Treatments	Various 215# to 290#	78 to 81	3 or 4	12" or 12-1/4"	36" or 36-1/4"	5"	A or C - All Wind Resistant
Individual Lock Down Basic Design	Several Design Variations	180# to 250#	72 to 120	3 or 4	18" to 22-1/4"	20" to 22-1/2"	-	C - Many Wind Resistant

(Wagner, 1979, 188)

Exercise B:

Construct a chart for the following selection (Anderson & Winslow, 1976, 101-103).

FLEXIBLE INSULATION

Flexible insulation is manufactured in two types, blanket and batt. Blanket insulation (Fig. 95, A) is furnished in rolls or packages in widths suited to 16- and 24-inch stud and joist spacing. Usual thicknesses are 1½, 2, and 3 inches. The body of the blanket is made of felted mats of mineral or vegetable fibers, such as rock or glass wool, wood fiber, and cotton. Organic insulations are treated to make them resistant to fire, decay, insects, and vermin. Most blanket insulation is covered with paper or other sheet material with tabs on the sides for fastening to studs or joist. One covering sheet serves as a vapor barrier to resist movement of water vapor and should always face the warm side of the wall. Aluminum foil or asphalt or plastic laminated paper are commonly used as barrier materials.

Batt insulation (Fig. 95, B) is also made of fibrous material preformed to thicknesses of 4 and 6 inches for 16- and 24-inch joist spacing. It is supplied with or without a vapor barrier. One friction type of fibrous glass batt is supplied without a covering and is designed to remain in place without the normal fastening methods.

LOOSE FILL INSULATION

Loose fill insulation (Fig. 95, C) is usually composed of materials used in bulk form, supplied in bags or bales, and placed by pouring, blowing, or packing by hand. This includes rock or glass wool, wood fibers, shredded redwood bark, cork, wood pulp products, vermiculite, sawdust, and shavings.

Fill insulation is suited for use between first-floor ceiling joists in unheated attics. It is also used in sidewalls of existing houses that were not insulated during construction. Where no vapor barrier was installed during construction, suitable paint coatings, as described later in this chapter, should be used for vapor barriers when blown insulation is added to an existing house.

REFLECTIVE INSULATION

Most materials reflect some radiant heat, and some materials have this property to a very high degree (4). Materials high in reflective properties include aluminum foil, sheet metal with tin coating, and paper products coated with a reflective oxide composition. Such materials can be used in enclosed stud spaces, in attics, and in similar locations to retard heat transfer by radiation. These reflective insulations are effective only when used where the reflective surface faces an air space at least 3/4 inch or more deep. Where a reflective surface contacts another material, the relective properties are lost and the material has little or no insulating value.

Reflective insulations are equally effective regardless of whether the reflective surface faces the warm or cold side. However, there is a decided difference in the equivalent conductance and the resistance to heat flow. The difference depends on (a) the orientation of the reflecting material and the dead air space, (b) the direction of heat flow (horizontal, up, or down), and (c) the mean summer or winter temperatures. Each possibility requires separate consideration. However, reflective insulation is perhaps more effective in preventing summer heat flow through ceilings and walls. It should likely be considered more for use in the southern portion of the United States than in the northern portion.

Reflective insulation of the foil type is sometimes applied to blankets and to the stud-surface side of gypsum lath. Metal foil suitable mounted on some supporting base makes an excellent vapor barrier. The type of reflective insulation shown in figure 95, D includes reflective surfaces and air spaces between the outer sheets.

RIGID INSULATION

Rigid insulation is usually a fiberboard material manufactured in sheet and other forms (Fig. 95, E). However, rigid insulations are also made from such materials as inorganic fiber and glass fiber, though not commonly used in a house in this form. The most common types are made from processed wood, sugarcane, or other vegetable products. Structural insulating boards, in densities ranging from 15 to 31 pounds per cubic foot, are fabricated in such forms as building boards, roof decking, sheathing, and wallboard. While they have moderately good insulating properties, their primary purpose is structural.

Roof insulation is nonstructural and serves mainly to provide thermal resistance to heat flow in roofs. It is called "slab" or "block" insulation and is manufactured in rigid units ½ to 3 inches thick and usually 2 by 4 feet in size.

In house construction, perhaps the most common forms of rigid insulation are sheathing and decorative coverings in sheets or in tile squares. Sheathing board is made in thickness of ½ and 25/32 inch. It is coated or impregnated with an asphalt compound to provide water resistance. Sheets are made in 2- by 8-foot size for horizontal application and 4- by 8-feet or longer for vertical application.

MISCELLANEOUS INSULATION

Some insulations do not fit in the classifications previously described, such as insulation blankets made up of multiple layers of corrugated paper. Other types, such as lightweight vermiculite and perlite aggregates, are sometimes used in plaster as a means of reducing heat transmission.

Other materials are foamed-in-place insulations, which include sprayed and plastic foam types. Sprayed insulation is usually inorganic fibrous material blown against a clean surface which has been primed with an adhesive coating. It is often left exposed for acoustical as well as insulating properties.

Expanded polystyrene and urethane plastic foams may be molded or foamed-in-place. Urethane insulation may also be applied by spraying. Polystyrene and urethane in board form can be obtained in thicknesses from ½ to 2 inches.

Cause and Effect

Literature in construction-related fields frequently teaches students to diagnose and correct common construction problems of stress and load. Such discussions are generally written in a cause and effect format. Once again, the making of a chart can facilitate notetaking. In this case, causes are listed in one column, opposite the possible effects. The columns may include categories other than "cause" and "effect" (Ex: "problem, symptoms, treatment").

Example:

The following textbook excerpt discusses food poisoning -- causes and effects, together with other categories pertaining to this specific health problem. An example of a "cause-effect" notetaking chart accompanies it.

Figure 16: Cause and Effect

LUMBER DEFECTS

A defect is an irregularity occurring in or on wood that reduces its strength, durability of usefullness. It may or may not detract from appearance. For example, knots commonly considered a defect may add to the appearance of pine paneling. An imperfection that impairs only the appearance of wood is called a blemish. Some of the common defects include:

KNOTS: Caused by an imbedded branch or limb of the tree, Fig. 4-14. They are generally considered to be strength reducing - the amount depending upon the type, size and location, See Fig. 4-15.

SPLITS AND CHECKS: A separation of the wood fibers along the grain and across the annular growth rings. Usually occurs at the ends of lumber - a result of uneven seasoning.

SHAKES: A separation along the grain and between the annular growth rings. Likely to occur only in species with abrupt change from spring to summer growth.

PITCH POCKETS: Internal cavities that contain or have contained pitch in either solid or liquid form.

HONEYCOMBING: Separation of the wood fibers in the interior section of the tree. May not be visible on the surface of boards.

WANE: The presence of bark or the absence of wood along the edge of the board. It forms a bevel and reduces the width.

BLUE STAIN: A discoloration caused by mold-like fungi. Objectional in appearance in some grades of lumber but has little or no effect on strength.

DECAY: A disintegration of wood fibers due to fungi. Early stages of decay may be difficult to recognize. Advanced stages result in wood that is soft, spongy, and crumbles easily.

HOLES: Holes in lumber will lower the grade. They may be caused by handling equipment or by wood boring insects or worms.

WARP: Any variation from true or plane surface. May include any one or combination of the following: cup, bow, crook, and twist (also called wind). (Wagner, 1979, 57-58).

LUMBER DEFECTS

Defect	Cause	Result
Knot	imbedded branch or limb	strength reducing
Splits & Checks	uneven seasoning	separation wood fibers along grain across rings
Shakes	abrupt spring summer growth change	separation along grain between rings
Pitch pockets	cavities of solid or liquid pitch	-------
Honeycombing	separation of interior wood fibers	-------
Wane	bark or lack of wood on edge	reduces width
Blue Stain	fungi	discoloration
Decay	fungi	soft, spongy wood crumbles easily
Holes	equipment, insects	lower grade
Warp	off true surface	cup, bow, crook, twist

Exercise C:

On a separate piece of paper construct a cause and effect chart, based on correcting paint problems (Feirer & Hutchings, 1976, 992-994). This is a direct cause-effect relationship of a simplistic nature.

CORRECTING COMMON PAINT PROBLEMS

By adhering to the recommendations in this unit, paint problems will be kept to a minimum. There are paint problems which may develop as a result of factors other than improper construction techniques.

Improper paint application can also cause problems. Described here are some of the paint problems resulting from poor construction techniques or improper paint application. The recommended corrective procedures are also given.

FLAKING OR CHALKING ON MASONRY

This problem is caused by inadequate surface preparation. The paint flakes off in scales or powders and chalks off. Fig. 50-18. This problem can be corrected by:

1. Removing flaking and chalking paint by wire brushing or sandblasting.

2. Sealing all surface cracks from moisture with a concrete patching material or a good quality calking compound.

3. Applying a masonry conditioner according to the label directions.

4. Applying two top coats of latex house paint or exterior masonry paint according to label directions.

CRACKING AND ALLIGATORING

This problem is created in two ways. The previous paint film may have been applied in several heavy coats without sufficient drying time between coats, or the undercoater may not be compatible with the finish coat. Fig. 50-19. This problem can be corrected by:

1. Sanding smooth the cracked or alligatored surface.

2. Applying one coat of undercoater and one top coat of a recommended house paint according to label directions.

PEELING GUTTERS

Peeling or cracking on such surfaces as galvanized metal gutters and downspouts is caused by improper metal primer or no primer on the galvanized metal. The paint thus has little or no adhesion. Fig. 50-20. This problem can be corrected by the following method:

1. Strip off all loose paint with a scraper, wire brush, or, best of all, a power wire brush. It is very important that all loose paint be removed. If not, succeeding coats of paint will subsequently peel away too.

2. When finishing with an oil base top coat, prime the bare spots with a primer made for galvanized metal. When finishing with a latex top coat, apply it directly to the bare galvanized metal after cleaning with a solvent. Before applying the top coat, be sure to allow the solvent to evaporate.

3. Finish with a top coat of latex or oil base house paint. Apply two top coats when a color change is involved of substantial bare metal has been exposed.

CHECKING

Checking is caused by plywood veneer cracking from expansion and contraction as it weathers and ages. Fig. 50-21. This problem can be corrected by:

1. Sanding the surface smooth.

2. Spot priming the exposed bare wood and cracks with an exterior undercoater, if the cracked area is not extensive.

3. Filling the primed cracks with calk.

4. Applying a top coat of recommended house paint.

NOTE: Should this problem be extensive, the best procedure is to replace the plywood. To prevent checking on new plywood, sand the surface smooth and apply one coat of latex wood primer and two coats of latex house paint according to label directions.

Exercise D: Suggested Reinforcement Activities/Textbook

Select three sections from the material you will assign to your students in the textbook. These sections must include each of the logical relationships discussed above (classification, comparison, cause-effect). Record the location of each relationship of each section and complete a note chart of each, using given examples as models.

A. Classification:

	Pg. #	Topic
1.		
2.		
3.		

B. Comparison

	Pg. #	Topic
1.		
2.		
3.		

C. Cause-Effect

Pg. #	Topic
1.	
2.	
3.	

Procedures:

Teaching Student to Recognize and Record Complex Information

Recognizing and recording complex information require higher-level comprehension skills, and are best introduced after the instruction and practice of paragraph comprehension. The three different relationships, together with the notetaking charts, should not be presented simultaneously. Students need to clearly understand the skill of classification, of comparison, and of cause-effect. Each skill with its appropriate notetaking chart should be introduced on a separate day.

With charting, explain that there is a definite relationship presented. This will help the students to recognize how to design the charts and to understand the organization of the material. Students need to know that one aspect of the relationship makes up one axis of the chart, while another aspect, the other axis.

If your text already presents charts or outlines of these types, the appropriate one should be presented first each day, followed by sample paragraphs or sections from which the students can construct charts as a class. Related homework assignments should be given as soon as the appropriate text selections are covered.

SECTION 8
DEVELOPING STUDY/READING SKILLS

DEVELOPING STUDY/READING SKILLS

Purpose:

Students of occupational skills need to develop certain study/reading behaviors to get the most from their reading materials. As a vocational teacher you can introduce these study techniques so that students can develop better study/reading habits. The following techniques are not difficult to instruct or to practice, but they will require repetition to be performed well. Some may seem awkward at first because of their newness, but students will become comfortable with them as they practice. When these techniques are used with students' own assigned reading materials, students should be able to see the benefits.

1) The Preview Procedure

A. Previewing the Entire Text

Have the students become acquainted with the total textbook before they begin reading individual chapters. They should be familiar with the overall contents of the book, the organization, and the aids which the author has provided. This would be assigned at the beginning of your course. A suggested format for previewing the entire text is included in Suggested Reinforcement Activities/Textbook in this section. This serves as a practical activity for you and can be used with your students.

B. Previewing the Text Chapter

The technique of previewing is getting an "overview" or a "general idea" of what the reading material is about -- before it is read. Previewing is performed by skimming, or moving the eyes and the mind very quickly over the information. Previewing before reading allows the student to see the big picture, to see what the author is going to discuss, and how the material is organized. Having this information before he/she reads helps the student to have improved comprehension during reading.

Previewing should be done quickly since students are to skim the material -- and not read it carefully. Therefore, students should spend no more than 5 minutes previewing a text chapter by skimming certain highlights the author has provided.

To obtain a quick overview, students should use the following guidelines:

Chapter title; illustrations, graphs, etc. plus captions; introduction; conclusion; bold, italicized print; subtitles; questions at the end.

You could initially introduce the guidelines for previewing. Then have the students practice the skill on chapters to be read. Time students for 5-7 minutes. At the end of the time limit, ask students orally what they found out and discuss as a group, or ask students

to write down what they learned about the chapter in those few minutes - words, phrases, names, complete ideas, etc. The recall should be done from memory since this forces the student to be more responsible for the information. As the class practices previewing, they will remember more with the same given time period.

Previewing is a very useful skill, and it does not require additional materials or large amounts of time. As an effective study technique it is largely recommended for classroom use. Students gain much more from their reading when they have ideas of what will be included in their reading than when they read "cold."

2) Recitation

Recitation is an oral or written recall (from memory) of material read. It is a helpful technique for students since it forces them to learn and remember the material rather than to copy it. They will have to assume responsibility for the information since they are working from memory. Benefits of recitation are improved concentration and comprehension.

Recitation can be a short activity of 2-3 minutes or it can last longer -- depending upon the task and the material. At first students will feel awkward utilizing this technique because they have had little practice with writing from

memory. They will become more comfortable and be able to recall more, as this skill is repeated.

Begin small and build. At first have students read 2-3 paragraphs and then write. Gradually increase the amount of reading. Practice this skill with your students throughout the course so that there is development.

The skill of recitation can be used in a variety of ways within your classroom. It is helpful at any-time when you want students to be involved, to learn and to remember material.

Possible activities include recitation:

1. after a chapter preview,
2. on an important section of information that needs to be reinforced and remembered,
3. periodically during reading of a text chapter,
4. as a review of class notes,
5. on supplementary material read (manufacturer's materials).

Another positive outgrowth of recitation is the written product. The students have organized and recorded thoughts on paper and this can be used for study purposes. This makes their time more efficient.

3) The Combination of Reading and Writing

The skills of reading and writing form a strong partnership. When a student reads material to be learned, he/she needs to write it down so that thoughts become organized and the student has a visual mode for commiting the material to memory. We all need to be "involved" as much as possible to acquire and to learn. Also, when a student writes down what he has read, he becomes aware of what he doesn't know or doesn't understand; he can see the "gaps." This is useful as a study/reading technique.

Involve your students in much writing, and in a variety of ways:

1) Written recitations,
2) Listing of important content vocabulary,
3) Paragraphs using important vocabulary and ideas to be learned,
4) Summaries of information learned about your occupational field from another reading source,
5) Written opinions about concerns and new trends in the occupational field.

In most professional fields, people must write in some form. You can help your students to gain confidence in this skill by giving them lots of practice, and at the same time help them to learn the information more completely.

4) Content Vocabulary Development

As previously mentioned in Developing Vocabulary Skills, "grasping" the content vocabulary is critical to the understanding of the health-related occupational literature. Emphasize throughout your course the need for learning the technical terms. Include them in your class discussions and in your homework assignments. (Refer to the activity suggestions in the vocabulary section of this book.)

5) Effective Reading Technique (Combination of Skills Currently Being Discussed

We do ask our students to study by themselves because we assume that by this age, they are able to do so. Many individuals, however, have not acquired efficient or useful skills -- especially for reading textbook chapters.

This section contains a brief overview of a study technique for textbook reading, which was orginally devised by Francis Robinson (1970). This technique has defined steps to be done in order, and it is intended to give students opportunity to better read, learn, and remember the information.

A typical procedure for students to use when studying a textbook assignment is to do nothing more than open the book and read the assignment. The more conscientious readers may follow up this initial reading by a second or even a third reading of the same useless type. Research has found a good method for helping the student to read a given selection with

better understanding and better recall. It is called the SQ4R method. It involves six basic steps: (1) Survey, (2) Question, (3) Read, (4) Recite, (5) Revise, (6) Review. Each of the steps is discussed under the appropriate headings below:

Survey: (same as preview)

Students use skimming technique to get a general idea of the chapter before it is read. This helps them to concentrate and to feel more involved as they read the chapter. To survey students glance at chapter title, subtitles, graphics, introduction, conclusion, bold and italicized type, questions at the end. Time allowed for survey is approximately 5 minutes.

After surveying, students should write down words and ideas from memory (recitation) -- what they know so far; they can spend 2-4 minutes on this. This helps them to see that they do have information before they begin reading.

(Surveying/Previewing is also discussed in this same larger section of Study/Reading Skills under 1-B.)

Question:

Students need guidelines for their reading. Using the information gained from the survey and the subtitles of the chapter, have students devise 7-8 questions. The questions should pertain to information included in the chapter and ones which they feel will be answered by the author. Questions need not be elaborate; their major purposes are further preparation for reading and

something for students to look for as they read. Questions are to be written down. This step should take approximately 10 minutes.

Read:

Keeping in mind the information gained thus far from the survey and question steps, the student begins reading -- looking for answers to the questions formed, and reading to learn the information. He is reading for important ideas now that he is study/reading. To hold concentration and to get the most out of the reading, encourage students to read for short blocks of time initially and build gradually. Begin with 10 minutes of concentrated reading.

Recite:

After a certain period of reading time, students should stop and write down ideas from memory (recitation). In this recitation they will include any answers to questions that may have been discovered and the important/main ideas of what they have read. This step helps them to learn and remember the information. They should keep the reading recitation with the survey recitation and the questions - so that a written sequence of study is available to them. This step takes 5-7 minutes.

Revise:

To insure accuracy students should open their text and see if they have recorded information correctly. Plus, they may want to make some additions of ideas missed. This step will require 2-4 minutes.

***THE READ, RECITE AND REVISE STEPS ARE THEN REPEATED UNTIL THE CHAPTER IS COMPLETE. IT IS IMPORTANT THAT STUDENTS UNDERSTAND TO REPEAT THESE 3 STEPS ONLY. PREVIEW AND QUESTIONS ARE PERFORMED ONCE PER CHAPTER.

Review:

With this technique students have a written produce to review. They should periodically review the survey, questions, reading recitations and revisions. When chapter is finished they can review the completed written process for their exam.

Benefits of the SQ4R:

1) Students have a written product for review and do not have to reread the chapter 2-3 times.

2) With so much writing students can learn the information more thoroughly.

3) In writing about what they are reading, students can see areas which are unclear and difficult and can seek help.

4) When students change subtitles within a chapter to questions and then read to answer those questions, much more will be obtained than if they merely read and answer questions at the end of the chapter. Students often copy to answer questions assigned. The process of formulating questions is a thinking exercise which "tunes students into the assignment."

5) Recitation (writing from memory) after reading helps students to learn information and they must understand it to write it down -- since they must depend of memory.

Teaching the SQ4R:

1. This procedure requires more time than merely reading a chapter, but the long-term rewards are there. Students do not have to reread chapters, just review certain parts. Also, the written notes can be used for consistent review and cramming the chapter the night before the exam is not necessary. Please emphasize these points with your students.
2. When teaching the procedure, introduce each step adequately. Explain "how" and "why" of each step so students feel comfortable and can recognize the benefits. Do not introduce all six steps at once. For example, on Monday, discuss previewing and practice for 2 days. Then add the question step and practice. Next, introduce the read, recite and revise steps as a unit and assign considerable practice to this. Then the students are ready to do the whole procedure on a chapter they have not read.
3. Use a format for the writing of their information, such as the one in Suggested Reinforcement Activities/Textbook #4. This gives organization to their written notes and definite guidelines for completing the technique.
4. Explain clearly the purpose for utilizing the SQ4R with textbook chapters.
5. Use the suggested time limits when teaching this technique to your students. Encourage them to stick to the time limits when they are working through the SQ4R on their own, since this keeps the system more time-efficient.

6. To be effective, this technique must be practiced over a long period of time. Assign this to be done for much of your reading assignments.
7. Students can work in class and at home with this technique. After the steps are understood, it is a good independent activity.
8. The SQ4R can be used with more than an entire text chapter. It can be used with chapter sections or with occupational handouts. Some adjustment of steps may be necessary - timewise, but the same sequence may be used with most reading materials.

Study Reading Skills

Exercise - Suggested Reinforcement Activities/Textbook

1) A. Previewing the Entire Text

Complete the following information by previewing the textbook which you use in your teaching.

1. Title:

   Author:

   Publisher:

   Copyright Date:

2. What is this book mainly about?

3. Look at the Table of Contents. What major topics are covered in the book?

4. Read the preface or introduction. Briefly, what does it say?

5. What types of graphics are in this text? (diagrams, photographs, charts, drawings, etc.)

6. Is this text well-organized in your opinion? Explain

7. Is this text easy to read or is it more difficult? Why?

8. Does the text have:

Preface or Introduction	_____	Chapter subtitles	_____
Table of Contents	_____	Chapter summaries	_____
Index	_____	Activities at end of chapter	_____
Glossary	_____		

B. Previewing the Chapter

Select 3 chapters from the text which you use in your classroom. Allow yourself 5 minutes to preview each chapter. At the end of the 5 minutes, write <u>from memory</u> what you learned. For previewing, use the guidelines listed in the discussion of previewing the text chapter.

*Also, try previewing other material which you have not read, so as to fully understand the skills your students will need to use.

Complete the following chart:

	Chapter #	Words and Ideas from Preview
1.		
2.		
3.		

2) Recitation

Select 4 sections of information throughout your textbook. Begin small (2-3 paragraphs) and gradually increase to a longer selection (2-3 pages). With each selection, read the material, close your book, and record information from memory (main ideas, important facts, vocabulary words). Use the following chart as a model and record the ideas on a separate sheet of paper.

	Page #	Recitation (written)
1.		
2.		
3.		
4.		

3) Content Vocabulary

Select 3 introductory chapters from the text you use with your students. List ten content words from each chapter that are essential to know for understanding of the material.

	Chapter #	Page #	Content words
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			

	Chapter #	Page #	Content words
14.			
15.			
16.			
17.			
18.			
19.			
20.			
21.			
22.			
23.			
24.			
25.			
26.			
27.			
28.			
29.			
30.			

4) The SQ4R Technique

Select a chapter you will assign to your students. Read the chapter according to the designated guidelines. Try to stick closely to suggested time limits. As you work through your chapter, complete the following form. (This same form should be used by students.)

I. Text title:

Chapter title:

II. Survey Recitation
(Record from memory what you learned in the survey.)

III. Questions
(Give yourself something to look for in the reading.)

IV. A. Reading Recitation I
(Record from memory what you learned during your first reading.)

B. Revisions

V. A. Reading Recitation II

B. Revisions

VI. A. Reading Recitation III

B. Revisions

*Use own paper if more space for reading recitation and revisions is needed. Do remember to read, recite, and revise to the end of the chapter.

Procedures: Teaching Students Study/Reading Skills

Study/reading skills lend strong support to being an efficient student. Practice with them will benefit performance in the health-related courses.

The techniques discussed can develop into natural study habits when they are introduced gradually, reinforced strongly and practiced throughout the course. The techniques do not necessarily require extra time, just different procedure.

To become personally familiar with the suggested study/reading behaviors, practice them by completing the activities included in "Suggested Reinforcememt Activities/Textbook." When you feel comfortable with the techniques, pass them on to your students. You may use the same activities with them, since the exercises are specific to the skills, but possible for a variety of materials.

SECTION 9

GUIDELINES: MAKING A READING ASSIGNMENT

GUIDELINES/MAKING A READING ASSIGNMENT

As was discussed earlier, students need guidance to acquire "the most" from a reading assignment. The SQ4R Method was described and recommended as an effective study/reading technique for construction trades text materials. This method is good for independent student work.

If you have a section of a text chapter, an essay, or a shorter occupational selection that you wish to cover in class as a total group activity, you can use the same procedure, but in an adapted form. Remember that it is important to "direct" the reading assignment; students will gain more, and you will see better results.

The following steps are suggested for directing a reading assignment:

1) Readiness

   A. Ask students questions related to the topic to be read: "What do you know about . . .?" "Have you ever read about . . .?"

   B. Ask students questions concerning personal experiences related to the selection: "Have you ever gone to the dentist and felt fear?" "Explain your ideas about . . . based on your past experience." "As a child did you ever . . .?"

   C. Introduce and discuss vocabulary terms which are important to the understanding of the reading. Place these on the board. Ask students if they know anything about any of the words; this will initiate discussion and you can briefly explain those terms that are totally unfamiliar.

D. Have students preview by glancing quickly over the material to get a general idea of what they will be reading about. Discuss as a group what the preview indicates will be contained in the material.

2) Purpose-Setting

Ask students to read for a specific purpose or purposes. Place a question on the board for them to keep in mind when reading. Looking for specific information will help them to concentrate more on the entire reading assignment. Also, ask students to add one or two questions to the purpose-setting, based on their preview and what they feel will be contained in the selection.

3) Silent Reading (Directed Reading)

Students will read the material silently, keeping in mind the vocabulary, the preview, and the purpose-setting. They have been prepared for the reading and now their reading is directed.

4) Purpose Check

Ask students for answers to the purpose-setting questions. This may result in a comprehensive class discussion, which students ask more questions and misconceptions are clarified.

5) Oral Re-reading

Ask students one or two questions in which the answer needs to be read aloud from the selection. Students will need to skim for the specific answer and this serves as a review. This task is appropriate for concepts which are more difficult and need to be reinforced.

6) Comprehension Check

If there is much information to be learned in your assigned selection you may want your students to answer more questions, written or oral. (In some cases the "purpose check" discussion will be sufficient.)

If you think more feedback is necessary, you can develop different levels of questions to evaluate comprehension.

Examples:

a. Why?
b. How?
c. Opinion questions
d. Vocabulary or phrases
e. Completion
f. Essay
g. Inference - not directly stated - "From the selection you can tell . . ."

7) Follow-up Activities

During this step the students are expected to increase their knowledge and use the information gained during the directed reading. Here the students apply the information so that it can be learned and remembered. Suggested activities are:

a. Writing assignment,
b. Further reading in other sources on the same topic,
c. Research project-library,
d. Interviewing a person who is informed on the topic.

Discussion: Helping Students Get More Out of a Reading Assignment

These suggested steps in directing a reading assignment may seem awkward or too time-comsuming upon first review. However, the process of preparation through follow-up is sequentially constructed for improved comprehension with a reading assignment. The process lends much guidance to a reading selection as a group activity and both you and your students will see the benefits.

SECTION 10
FURTHER SUGGESTIONS: READING SKILLS DEVELOPMENT

FURTHER SUGGESTIONS/ READING SKILLS DEVELOPMENT

There are many components of effective reading skill development. These should be considered when integrating reading skills with the occupational content. This text has covered skill areas of vocabulary comprehension, and study-reading.

Following are suggestions for certain procedures which can be further beneficial in the instruction of reading skills:

A. Increased Student Responsibility

Skills require practice, and student responsibility in the improvement of the instructed skills should be emphasized. Make extensive outside assignments of the suggested activities introduced in this text, as well as practice in the classroom. Students will be using the occupational materials which you wish them to know, so extra planning for you is minimal. Plus, the "manipulation" of the material through the skill practice will help students to really learn the information required in the construction trades field.

B. Evaluation of Activities

With the recommendation of many assigned skill activities, you may wonder how you will grade them. There are ways to give students ample responsibility and avoid the "not enough time to grade" dilemma.

1) Not all assignments must receive a letter grade. Some activities are assigned strictly as practice and should only receive a credit grade for completion. The practice, however, should be accompanied with class discussions of specific guidelines for practicing the skill and of problems which arise as students work with the skills. (Credit Grades: + ✓+ ✓ ✓-)

2) Students, after having guidelines for performing the skills, can work in pairs and evaluate each other's work. Students often encounter the same difficulties and can help each other better understand what to do.

3) Explain to your students that some assigned work is for practice over a period of time and must be compiled as a notebook for a composite grade. Students would begin with the easier skills and build to the more difficult ones -- using the material which are required for your course. With this, evaluation occurs less frequently.

C. Student Evaluation

Increased student responsibility can also include written evaluation of activity and/or of own performance. Have students evaluate certain units of study or sets of skill activities. Their input can help you to make improvements and to better recognize some of their needs. Set up specific criteria, such as "excellent, very good, satisfactory, unsatisfactory" -- as an overall rating. Then ask for specific comments as to strengths, needed improvements, possible additions, etc. These same ideas can be transferred to a self-evaluation form for performance on an activity or group of activities.

Student evaluation forms can be simplistic so that exact guidelines are known, and so that students feel comfortable with this process. With the evaluations students can have more input into course planning and can become more aware of personal performance.

D. Instructing Skills Together

The major reading skill areas mesh well together, and can be combined effectively in instruction. Vocabulary does not have to be developed separately from comprehension. For example, contextual analysis can be introduced and practiced briefly, and then the main idea could be presented. These two skill areas could be practiced together on the same selection, or could be done on different materials, but within the same class period.

Vocabulary, comprehension and study/reading skills can be combined throughout your course. Students will be able to see how skills do depend on each other and that reading skill development is a total package -- which should be continued as such.

E. Writing Skills

The importance of increased writing experience has been discussed earlier in "Developing Study/Reading Skills." Writing involves the student more in the material to be

learned, helps the student to organize thoughts and to understand and remember the information, and provides practice for a skill which is considered deficient in much of our population. Integrating reading and writing skills should add a well-rounded dimension to your instruction.

A useful activity with writing skills is to have your students write in their own words. Here, the students must understand the material. Repeated practice will enable them to build confidence and to greatly improve their ability to write in their own words.

BIBLIOGRAPHY

Althouse, A. D.; Turnquist, C. H; and Bracciano, A. F. Modern Refrigeration and Air Conditioning. South Holland, Illinois: The Goodheart-Willcox Company, Inc., 1975.

Anderson, L. & Winslow, T. Wood-frame House Construction. Solana Beach, CA: Craftsman, 1976.

Baird, R. Industrial Plastics. South Holland, Illinois: The Goodheart-Willcox Company, Inc., 1976.

Ball, J. Exterior and Interior Trim. Albany, NY: Delmar, 1975.

Blake, K. A. College Reading Skills. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1973.

Blankenbaker, E. K. Modern Plumbing. South Holland, Illinois: The Goodheart-Willcox Company, Inc., 1978.

Broekhuizan, R. Graphic Communications. Bloomington, Illinois: McKnight Publishing Company, 1979.

Brown, R. A First Language: The Early Years. Cambridge, Massachusetts: The Harvard University Press, 1973. In Gibson and Levin, The Psychology of Reading. Cambridge, Massachusetts: The MIT Press, 1979.

California Redwood Association. "Redwood Fences." San Francisco, 1973.

_____. "Residing and Paneling With Redwood." San Francisco, 1968.

Cogoli, J. Photo-offset Fundamentals. Bloomington, Illinois: McKnight Publishing Company, 1980.

David, W. Business Data Processing. Menlo Park, CA: Addison-Wesley, 1978.

Everard, K. E.: Shilt, B. A. Business Principles and Management (seventh edition). Cincinnati, Ohio: South-Western Publishing Company, 1979.

Feirer, J. & Hutchings, G. Carpentry and Building Construction. Peoria, Illinois: Bennett, 1976.

Flesch, R. The Art of Readable Writing. New York: Harper and Brothers, 1949.

BIBLIOGRAPHY (Continued)

Fry, E. B. "A Readability Formula That Saves Time." Journal of Reading, 11 (April, 1968), pp. 513-16, 675-78.

Gibson, E. J. & Levin, H. The Psychology of Reading. Cambridge, Massachusetts: The MIT Press, 1979.

Kicklighter, C. E. Modern Masonry. South Holland, Illinois: The Goodheart-Willcox Company, Inc., 1980.

Kowtaluk, H. & Kopan, A. Food for Today. Peoria, Illinois: Chas. A. Bennett Co., Inc., 1977.

Krar, S. F. & Oswald, J. W. Turning Technology, Engine and Turret Lather. Albany, NY: Delmar Publishers, 1971.

Krek, R. T. Masonry Skills. Albany, NY: Delmar Publishers, 1976.

Morgan, W. Supervision and Management of Quality Food Preparation. Berkeley, California: McCutchan Publishing Corp., 1974.

Mullin, R. C. Electrical Wiring, Residential. (Based on 1981 National Electrical Code.) Albany, NY: Delmar Publishers, 1981.

Roy, M. & Lewis, E. Exploring Professional Cooking. Peoria, Illinois: Chas. A. Bennett Co., Inc., 1980.

Richardson, R. E. & Barton, R. E. The Dental Assistant (fifth edition). New York: McGraw-Hill Book Company, 1978.

Richmond. Dowell Bar Substitution. Fort Worth, Texas: Richmond Screw Anchor, Inc., 1975.

Rosenberg, R. R. & Bonnice, J. G. Business Law/30 (second edition). New York, New York: McGraw-Hill Book Company, 1976.

Rowe, K. & Jimerson, H. Communications in Marketing. New York, NY: McGraw-Hill Book Company, 1971.

Sacks, R. Welding: Principles and Practices. Peoria, Illinois: Chas. A. Bennett Co., Inc., 1976.

Toboldt, B. Autobody, Repairing and Repainting. South Holland, Illinois: The Goodheart-Willcox Company, Inc., 1979.

Thornton, L. J. Carpentry Literature: Readability vs Reading Ability. Utica, New York: State University of New York College of Technology, 1977.

BIBLIOGRAPHY (Continued)

Thornton, L. J. Relationship of Readability of Carpentry Literature to the Reading Abilities of Secondary Carpentry Students. Occupational Education Forum (1979): 35-50.

Thornton, L. J. Basic Reading Skills and Vocational Education. Columbus, Ohio: National Center for Research in Vocational Education, 1980(a).

Thornton, L. J. Review and Synthesis of Reading in Post-Secondary Occupational Education (Monograph). University Park: Division of Occupational and Vocational Studies, The Pennsylvania State University, 1980(b).

Thornton, L. J. Procedural Yields of Readability Analysis of Carpentry Literature: Curricular and Occupational Relationships. (Doctoral Dissertation). University Park, Pennsylvania: The Pennsylvania State University, 1981.

Thornton, L. J.; Waters, L. B.; and Lee, T. Vocational Reading Series: Carpentry, Cosmetology, Data Processing, Medical Assisting, Radio & T.V. University Park: Division of Occupational and Vocational Studies, The Pennsylvania State University, 1980.

U.S. Department of Agriculture. "Fire Resistant Construction." (Farmers' Bulletin No. 2227). Washington, DC: U.S. Government Printing Office, 1973.

U.S. Department of Agriculture. "Wood Siding: Installing, Finishing, Maintaining," (Home and Garden Bulletin No. 203). Washington, DC: U.S. Government Printing Office, 1973.

Wagner, W. Modern Carpentry. South Holland, Illinois: Goodheart-Willcox, 1979.

Walker, J. R. Exploring Metalworking, Basic Fundamentals. South Holland, Illinois: The Goodheart-Willcox Company, Inc., 1976.

Wass, A. & Sanders, G. Materials and Procedures for Residential Construction. Reston, Virginia: Reston Publishing Company, Inc., 1981.

Wircenski, J. L.; McPherson, M.; & Feng, D. Employability Skills Curriculum Guide for Special Needs Learners. University Park: Division of Occupational and Vocational Studies, The Pennsylvania State University, 1980.

Wood, L. & Rambo, B. Nursing Skills for Allied Health Services. Philadelphia, PA: Saunders, 1977.